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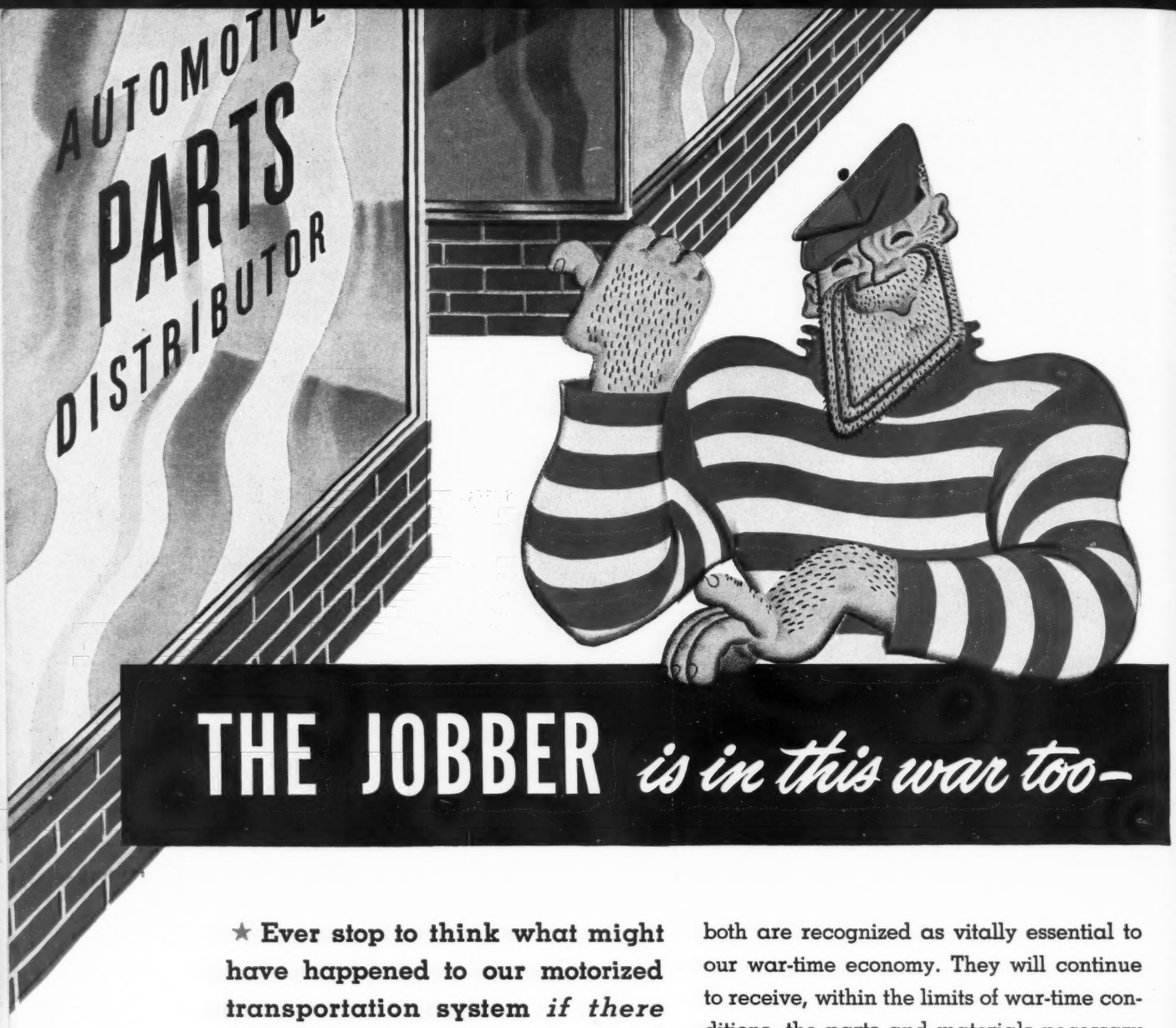
MOTOR AGE

FOR AUTOMOTIVE SERVICEMEN

A CHILTON PUBLICATION



THE JOBBER *is in this war too—*

★ **Ever stop to think what might have happened to our motorized transportation system *if there had been no jobber stocks of replacement parts?***

All-out production for war interrupted the normal supply. Many dealer stocks were soon exhausted. Here the backlog of jobber stocks stepped in, withstood the initial shock, and kept our cars, trucks and tractors going.

It is significant that today the motor service man, and the jobber who supplies him, both are recognized as vitally essential to our war-time economy. They will continue to receive, within the limits of war-time conditions, the parts and materials necessary to repair and service the nation's motor vehicles.

Keep up the good work. Check up on the piston rings of every car you service. That's one way to save a lot of needless wear, as well as prevent wasting of oil and gasoline. Your Hastings distributor has ample stocks of Steel-Vent Motor Engineered sets, ready to serve your customers' needs.

HASTINGS MANUFACTURING COMPANY, HASTINGS, MICHIGAN

Hastings Mfg. of Canada, Ltd., Toronto

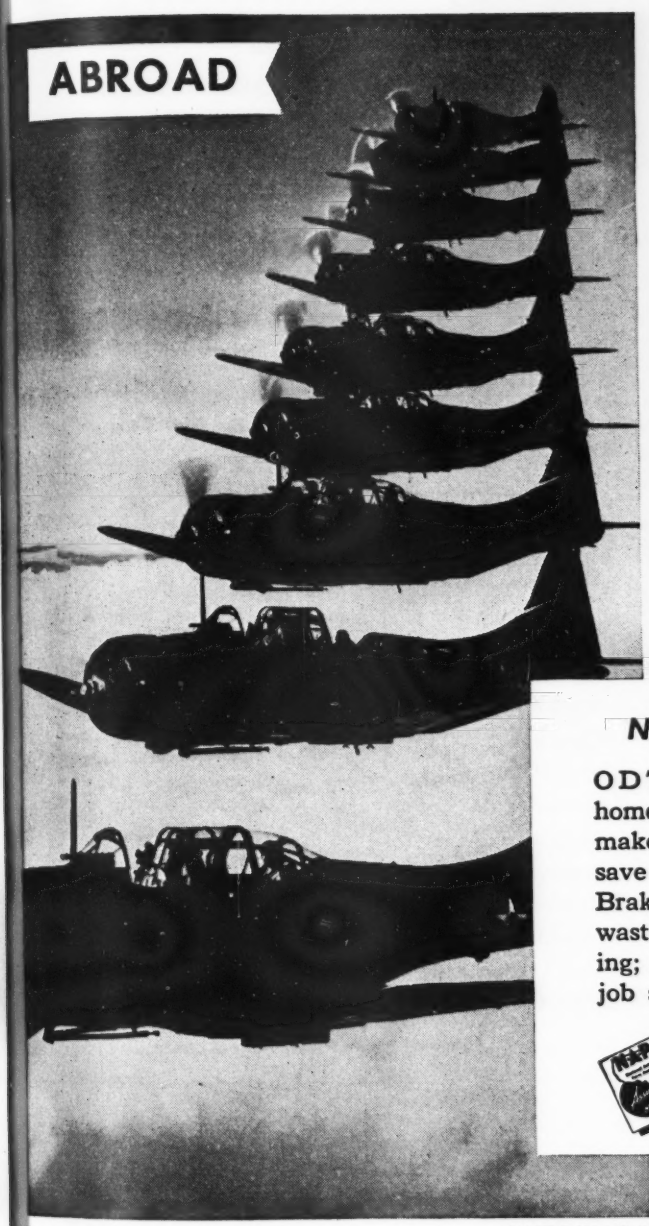
HASTINGS

STEEL-VENT PISTON RINGS

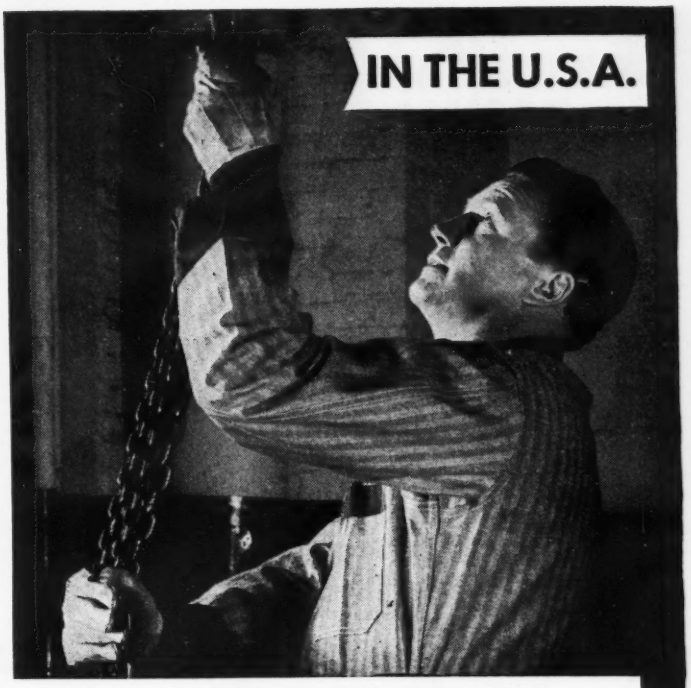
U. S. Patent Nos. 2,148,997, 2,175,409

Tough on oil-pumping · Gentle on cylinder walls

ON-THE-DOT TIMING!



Official U. S. Navy Photo



No time to lose in the air or in your shop!

ODT says we must keep 20 million cars rolling at home to win on world-wide fighting fronts. That makes every minute important in your shop. You can save time by recommending American Brakeblok Brake Lining. It's nationally advertised, you won't waste time "selling" American Brakeblok Brake Lining; your customers accept it quickly, you're on the job sooner.

American Brakeblok Brake Lining is quickly available everywhere through the nation-wide NAPA system of warehouses and jobbers.

American Brakeblok offers you a comprehensive line of fan belts, curved and straight radiator hose, woven and molded clutch facings.

THE AMERICAN BRAKE SHOE & FOUNDRY COMPANY
American Brakeblok Division, Detroit, Michigan

American Brakeblok
BRAKE LINING

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"The impetus given by the war to AIR EXPRESS operations . . . is indicated in figures for the first ten months of 1942 showing a rise of 93.6 per cent in pounds carried . . . Despite release of about half of commercial air-line equipment to the Army early in the year, nevertheless, by rearrangement of schedules, increasing plane hours a day, and stepping up plane maintenance and servicing, air lines are equaling and even surpassing pre-war performance."

Excerpt from *New York Herald Tribune*, January 11, 1943

Although you do not need a priority to ship by AIR EXPRESS, if you have war production shipments requiring priorities, they will be granted. Phone Railway Express Agency, AIR EXPRESS DIVISION, or any air line.

NOW IN ITS 16th YEAR

AIR EXPRESS

Division of RAILWAY EXPRESS

MOTOR AGE

With Which is Combined AUTOMOBILE TRADE JOURNAL

FOR AUTOMOTIVE SERVICEMEN

Vol. LXII, No. 3 February, 1943

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FEBRUARY · 1943

MOTOR AGE

SHOP TALK

by

Bill Toboldt

MANPOWER

On the next two pages we're publishing the results of our nation-wide survey of the manpower situation in the automobile service field. It shows the shortage of experienced men to be less than some estimates have made it appear, but it shows with equal clarity that governmental efforts to correct the situation have been too late and too little.

An interesting sidelight of the survey was the disclosure of the serviceman's resourcefulness. Denied official assistances so long in his efforts to hold key men, he has just about exhausted every possibility of keeping some kind of working force intact. He has tried to train young men, women and old men; he raised the pay of his key men until the wage-limitation order put a stop to that. He has had high school boys work in the shop after school.

But for his determination to carry on regardless of all difficulties, the manpower situation in automobile shops would be worse than the figures on the next two pages show.

NEW MODELS

Anyone wishing to see a post-war car can do so today by going to the nearest car dealer and asking to see a 1942 model. At least, that's what most Detroit factory men say, explaining that their engineers are far too busy on war work to do anything else. The first real post-war model will not be ready until two years after hostilities cease, most authorities say.

RUBBER

At the time of going to press, the whole rubber predicament was being given an airing in Congress. The surprising thing is not that an undertaking so vital to the war effort should be the subject of such heated debate but that the situation should have deteriorated so badly since last September when the Baruch Committee report was published.

When Jeffers was named to head up the rubber administration, he was generally regarded as the power that would save motor transportation in the country from complete collapse, and would eventually attain the goal set by the Baruch Committee of providing sufficient synthetic rubber to keep American automobiles rolling. Now it is charged by Army and Navy spokesmen that Jeffers is a virtual saboteur, bent on hogging materials vitally needed for war materiel. The charges were made in rebuttal to Jeffers' insistence that the armed forces were trying to starve the synthetic rubber program.

It may be a pity that controversies so bitter as this should be fought on the domestic front in wartime, but it is more of a pity that major disagreements on policy should exist in high places.

Automobile and truck owners will back Jeffers. If he loses, they lose.

PROSPERITY

In spite of every conceivable obstacle—shortages of replacement parts, gasoline and tire rationing, and price ceilings—the repair shops of the country are actually doing more business this year than last, and could do more if they had the men.

We have just completed a study, covering every section of the country, that shows the favorable position of shops at this time. It will be published in our March issue. It will show you how other operators are faring in your section of the country and in your type of shop.

REPAIR SHOPS LOSE

112,000

MECHANICS

MOTOR AGE Survey shows that shops are busier than last year with only

A NATION-WIDE MOTOR AGE survey, covering independent repair shops as well as dealer shops, reveals that the number of automobile mechanics employed today is just 38 per cent less than a year ago. This represents a loss to the transportation industry in the last 12 months of approximately 112,000 trained men.

This figure is somewhat lower than that disclosed by a survey conducted some weeks ago by the National Association of Automobile Dealers. In that survey, covering only dealer shops, the number of men going into the armed forces, war plants and other jobs totaled 45 per cent.

Critical as the MOTOR AGE figures for both dealer and independent shops show the manpower shortage to be, they do not represent fully the difficulty faced by most shops, for the great majority of them, despite gasoline rationing and the parts shortage, are finding the demand for service and repairs substantially greater than it was a year ago.

The mechanic shortage varies in degree among the different sections of the country as well as between metropolitan and rural shops. The shortage is gravest along the East Coast. In that area, the loss during the year was 44.5 per cent. The South's loss of 42.6 per cent was almost as high.

Generally speaking, the shortage is more pronounced in urban communities than in rural areas. For the purpose of the survey, communities of 10,000 population or more were classed as metropolitan areas, those with lower population as rural. Figures show that the mechanic loss by metropolitan shops was 40.7 per cent, while rural shops lost 35 per cent. However, there is one striking exception. Along the East Coast, loss by metropolitan shops was 42.5 per cent but rural shops lost 46.8 per cent. In California, there was virtually no difference between the losses by the two types of shops.

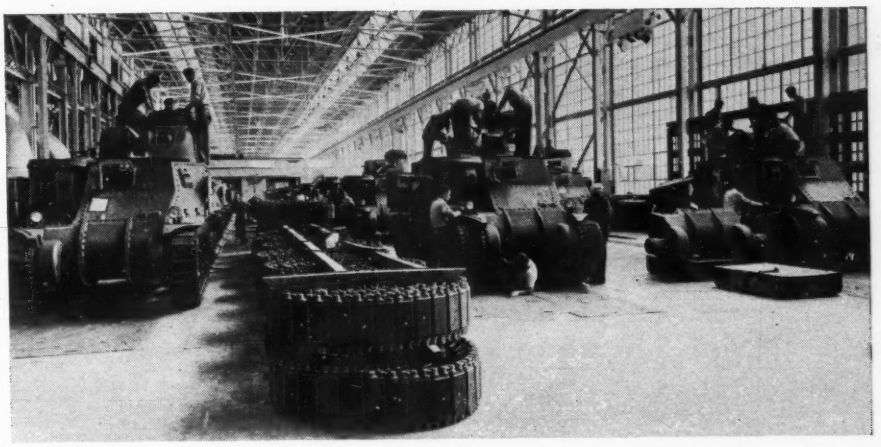
The loss of apprentices, including helpers, was less than the drop in the number of full-fledged mechanics but great enough to be a handicap, particularly at a time when trained mechanics are virtually impossible to obtain. For the country as a whole, the loss of apprentices and helpers amounted to 30.3 per cent. The loss was far higher in the East and on the West Coast. In the Midwest, the loss was moderate and Southern rural shops were employing more apprentices this year than last.

The figures on the number of mechanics needed to handle the present demand for automotive repairs and service are based on the estimates of the shop operators themselves. They show that 1.67 additional mechanics are needed for every shop in the country, or five additional men for every three shops.

While there can be no disputing the figures on the number of men lost, the number of replacements needed, being an estimate, may be subject to error. The figures given, if applied country-wide, would mean an additional 130,000 mechanics, or 18,000 more than were lost. While it is conceivable that more mechanics are needed today than in 1941 to handle the increase in business, it is possible that some shop operators are misled as to the actual demand. Many owners today visit two or three shops before finding one that has the manpower to handle their work. So far as the individual serviceman can see, every job he turns down is a job lost to the industry, whereas he is only one of two or three shops turning away the same job.

It has been argued by government officials that the loss in mechanics has been offset by the retrictions on driving, which are said to curtail the need for repairs and service. This is not borne out either by the volume of business being done by repair shops today or by an understanding of the nature of automobile service. A great deal of service, particularly battery service and lubrication, is regulated by the time element rather than by mileage.

The survey was made more than a month after gas rationing be-



62 per cent as many men

came effective over the whole country, yet 65 per cent of the shops reported improved business. Only 17 per cent were doing less business than last year.

It has been said also that the number of shops going out of business has tended to offset the need for mechanics. This is an entirely false assumption. The MOTOR AGE survey shows that only 7 per cent of the country's independent repair shops ceased to operate during 1942 and that only 12 per cent of the dealer shops closed during the same 12 months.

Belatedly, the War Manpower Commission and Selective Service have recognized the threat offered by the mechanic shortage to our transportation system. First listed as an essential occupation by the War Manpower Commission, automotive maintenance has now been recognized by Selective Service as an occupation entitling a mechanic to consideration for deferment. These facts, together with the President's order restricting the draft to men under 38, will lighten the drain on shop manpower, but such relief as these measures affords comes too late to keep a sufficient number of trained men on the job of maintaining the nation's vital motor vehicles. They can, however, prevent further depletion of service manpower. Failure to do so could jeopardize the whole war effort.—J. E. F.

Mechanics Employed

1941	1942	Loss
294,100	182,100	112,000

Mechanics Lost in Year

	Rural	Metropolitan	Both
Midwest	26.2%	39.3%	32.0%
East Coast	46.8%	42.5%	44.5%
South	28.5%	44.9%	42.6%
West Coast	36.9%	36.4%	36.7%
United States	35.0%	40.7%	38.0%

Apprentices Lost in Year

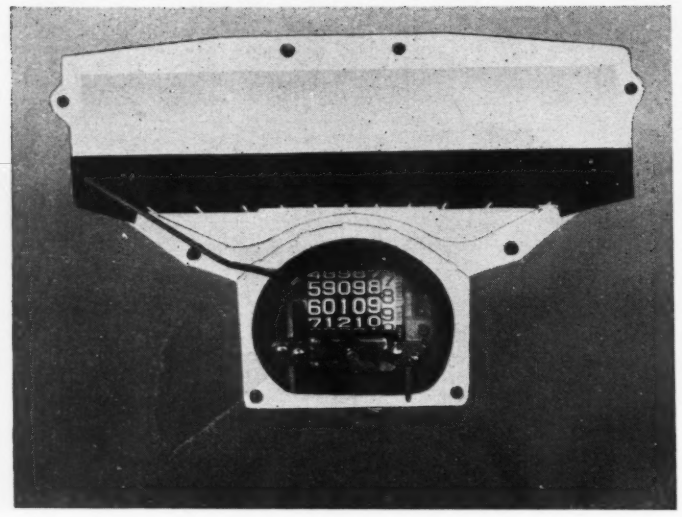
Midwest	14.3%	29.3%	20.4%
East Coast	48.7%	41.7%	44.7%
South	30.0%	+.6%	12.0%
West Coast	41.4%	48.2%	43.0%
United States	29.8%	30.8%	30.3%

Mechanics Needed (Per Shop)

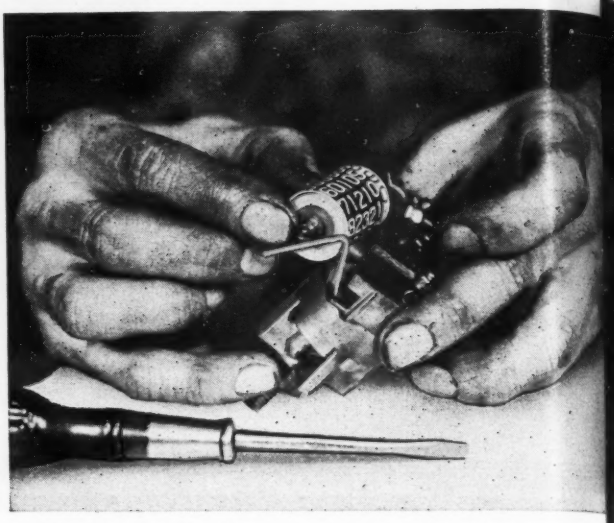
Midwest	1.14	1.92	1.44
East Coast	1.16	2.20	1.64
South	1.66	4.00	3.12
West Coast	1.71	2.14	1.85
United States	1.32	2.17	1.67

Apprentices Needed (Per Shop)

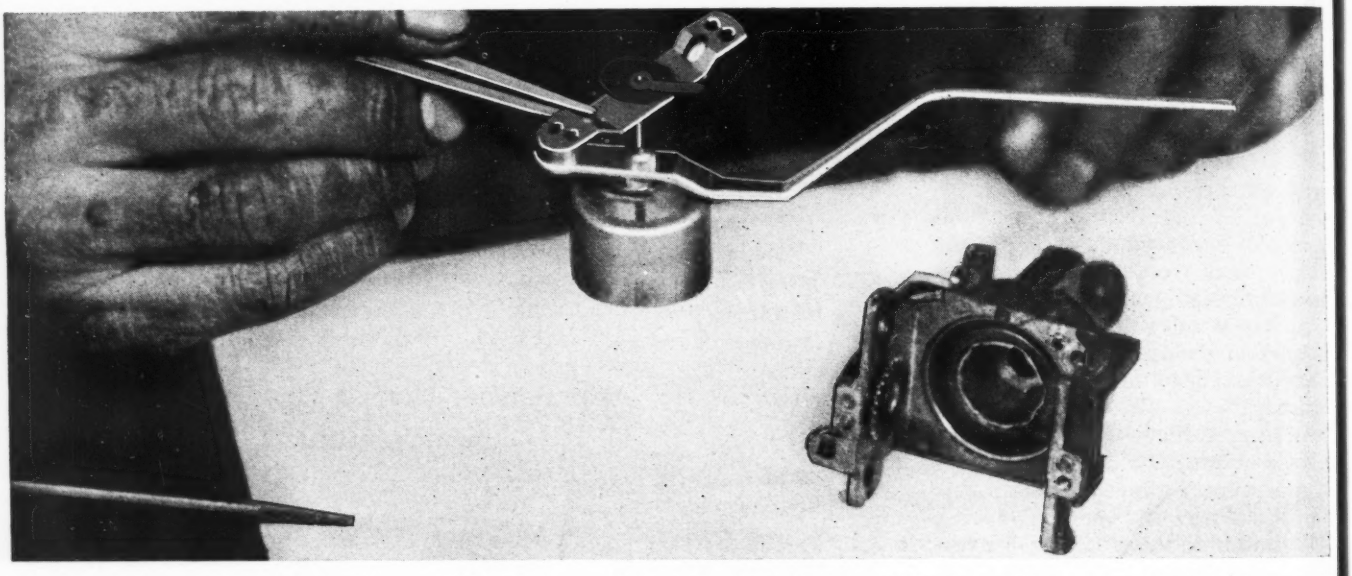
	Rural	Metropolitan	Both
Midwest	.57	.94	.72
East Coast	.62	1.24	1.09
South	1.00	1.45	1.31
West Coast	.69	.50	.65
United States	.62	.97	.77



1. Speedometer head removed from the instrument panel and ready to be dismantled. Remove the two screws in the back of case and take the unit out of the housing.

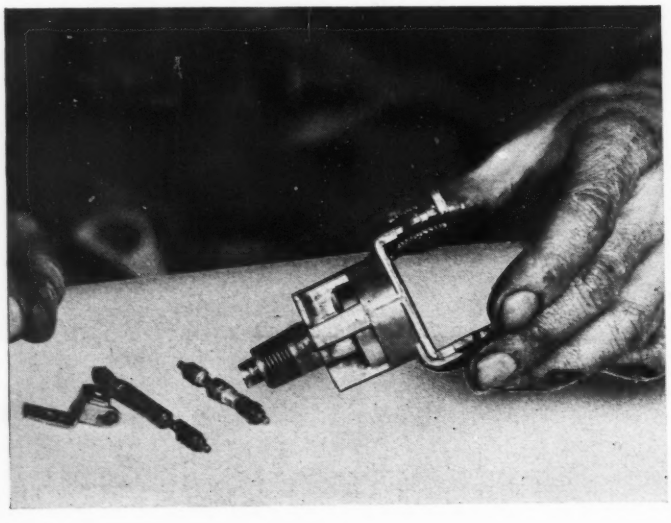


2. After the unit has been removed from the housing, pull back the spring holding the numeral roll shaft in place and lift out the universal roll.

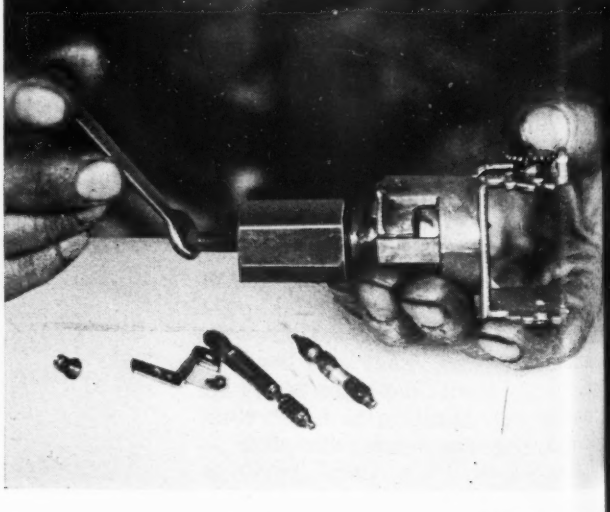


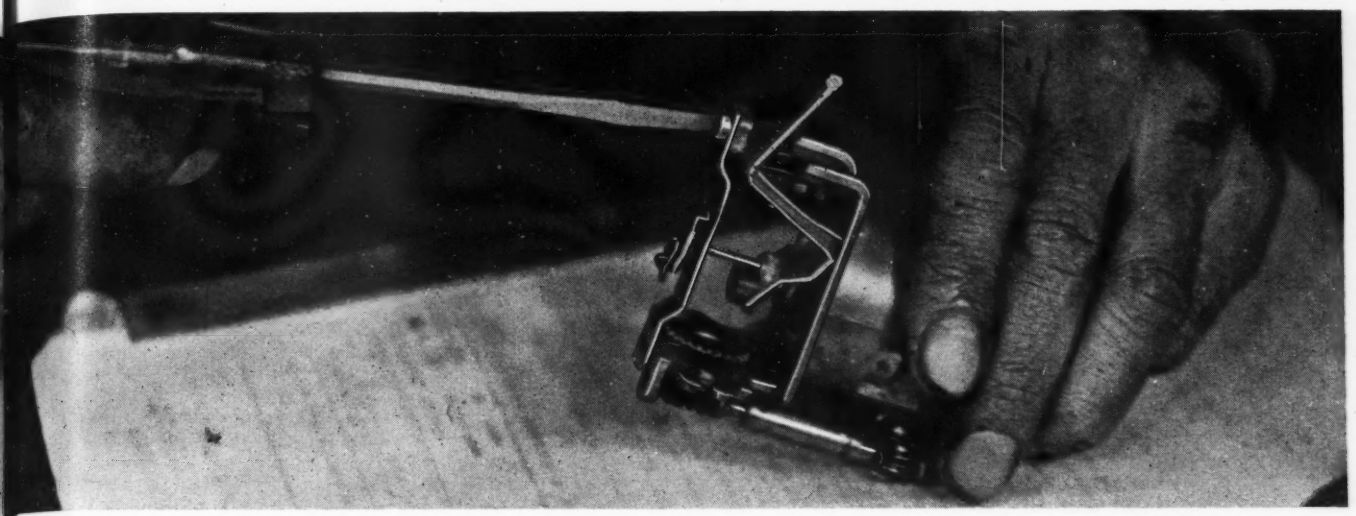
4. Lift out the speed cup and bracket assembly. This assembly contains the hair spring which governs the accuracy of the instrument and upon removal should be protected against damage.

5. Remove the screw which holds the bracket that acts as the bearing for the first and second speed gear shafts and remove the bracket and gears from the frame.



6. Install the special tool for pushing out the magnet and shaft from the frame and, using a wrench to tighten the stud, push out the main drive shaft and magnet assembly.





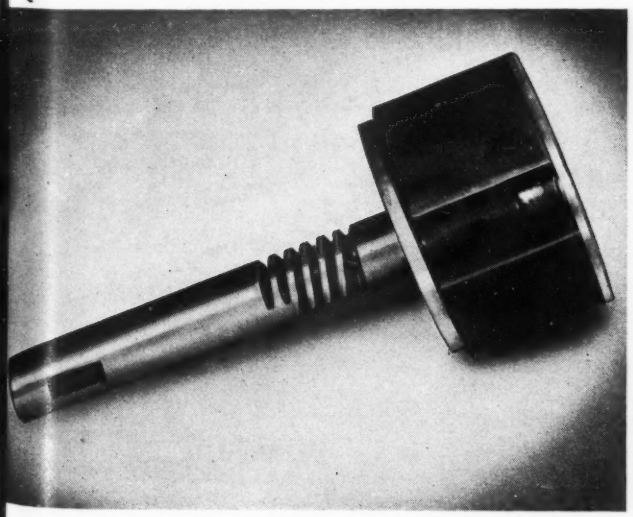
3. Take out the two screws holding the speed indicator shaft, needle and hair spring. Remove the screw holding the speed cup shaft rear bearing and lift out the bearing.

SPEEDOMETER SERVICE

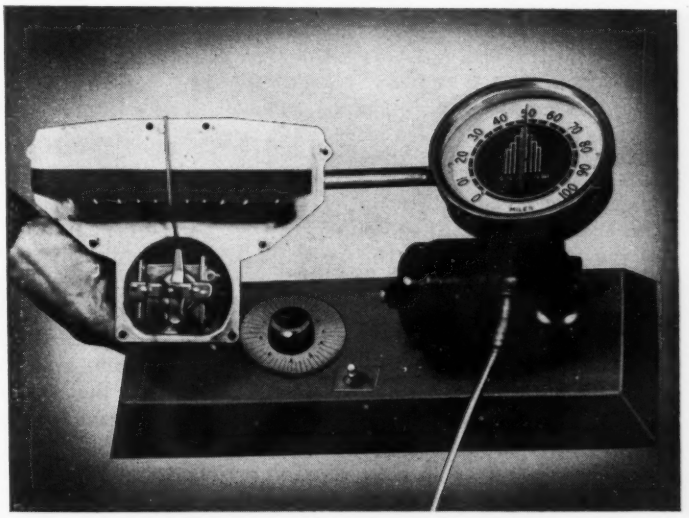
Follow the step-by-step procedure shown here and you'll do faster, better work on the Stewart-Warner unit used on the 1941 Hudson

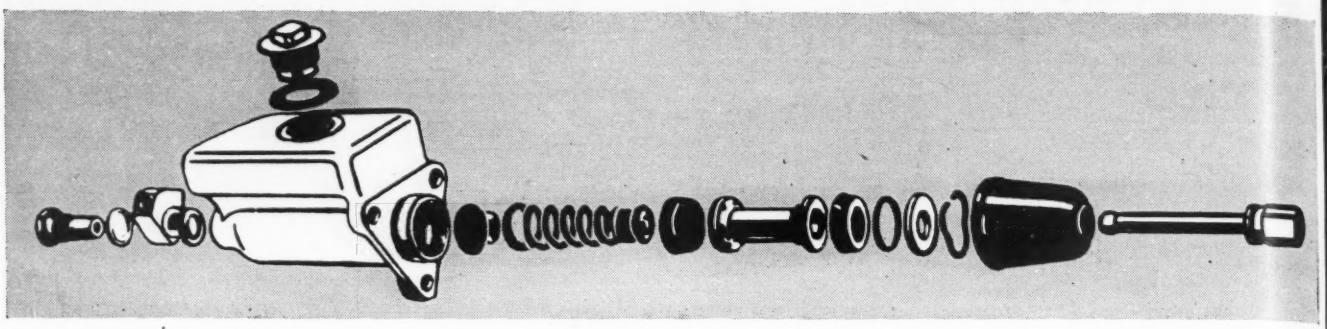
By ***BOB TURNER***

7. If the magnet has lost sufficient magnetism the entire shaft and magnet assembly should be replaced. Remagnetizing this particular type of magnet is not recommended.



8. After the unit has been repaired and reassembled it should be mounted on the calibrating stand and the hair spring lever adjusted to make the speed needle correspond to the master speed head.



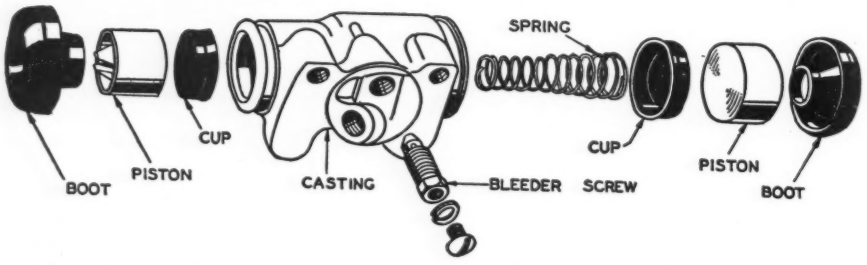


Assembly of a hydraulic-brake system master cylinder. Unit shown is a popular make and is widely used on both passenger cars and trucks.

LESSONS IN

BRAKE SERVICE

Here in a compact article are all the facts a new man needs to know about master and wheel cylinders



Brake-cylinder assembly. The unit is used on same systems as the master cylinder above.

LESSON No. 2

HYDRAULIC brake master cylinders must be removed from the car for reconditioning. To do this, the hydraulic lines connecting the master cylinder to the rest of the hydraulic system must be disconnected and the actuating push rod must be disconnected at the brake pedal. Then, after the mounting bolts have been removed, the master cylinder can be removed from the car.

To disassemble the combination-type master cylinder, which is used on most present-day cars, the procedure is simple and can be easily performed by apprentice mechanics

After removing the large clamp ring fastening the protecting boot to the cylinder, remove the push rod and boot together.

This will give access to the first piston spring steel stop wire. After that has been taken out of the cylinder, remove the piston stop. Then remove the piston, primary cup, return spring, and check valve in the order named.

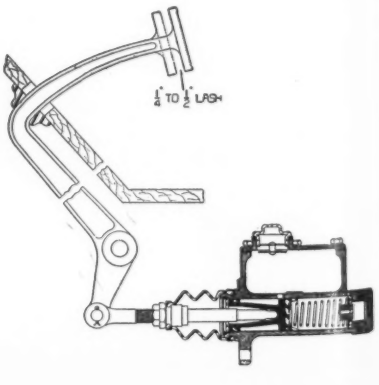
Some master cylinders use a two-piece valve and a removal head at the end of the cylinder. When inspecting or replacing the rubber valve seat, it is necessary to remove this cylinder head. Special wrenches are available for removing this head and can be obtained from any Wagner Electric branch.

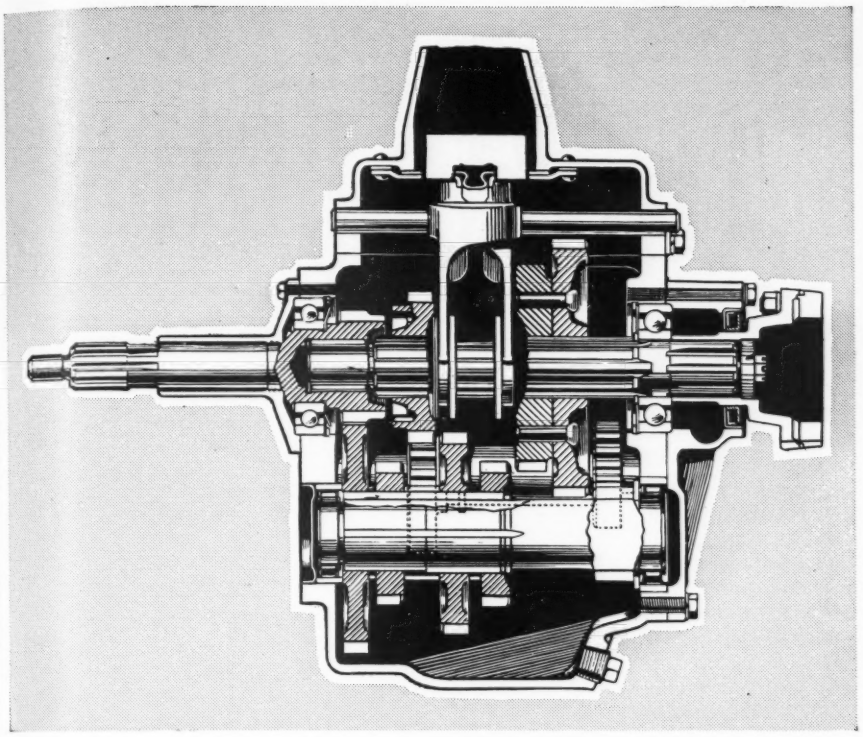
The next step is to make a thorough inspection of the various parts of the master cylinder. First of all, run a special tool or wire through the port to remove any gum or other obstruction. Examine the primary cup, making sure that a groove has not been worn in the cup by passing over the port hole Use a burring tool to remove any sharp edges of the cylinder port hole. Discard the used cup.

Carefully examine the cylinder bore for scratches, pits and grooves. In most instances, it is found advisable to recondition the cylinder walls by means of special hones designed for that purpose. Special gages are available to determine when cylinder diameters have been enlarged to such size as to be no longer serviceable. This is very important, for, obviously, when the cylinder is too large, the piston cup will fit too loosely and will permit hydraulic brake fluid to pass by. After honing, always remove any

(*Continued on page* 60)

Adjustment of pedal link rod for clearance.





SERVICING

GMC TRUCK

TRANSMISSION

GMC TYPE CI-½ 4-SPEED

Spur Gear

Standard Equipment on GMC Truck Models

CC-300	CCS-300	CF-350	CCT-350
CCW-350	CCS-350	CC-350	CFW-350
CCK-350	CF-300	CFT-350	

Special Equipment on GMC Truck Models

CC-260	CCV-100	AF-240
CC-100	CC-150	CC-250

THE first step in overhauling the GMC type C1-½ 4-speed transmission is to remove the unit from the truck. To do this, first remove the floorboards and disconnect the foot-brake pull rods. On some models, the foot-brake pull rods are not mounted on the transmission and, therefore, do not have to be removed. Now disconnect the speedometer cable and remove the speedometer drive pinion. If the particular model of truck being worked on has a propeller-shaft center bearing, remove the bolts from the flanges of the front and rear shafts and then remove the nuts from the bolts holding the center bearing in position. This will allow the whole drive line to be removed as an assembly. On models that have a strut or brace rod between the transmission and the frame cross member, the strut must be removed. Next remove the lower clutch housing and the two lower transmission support screws from inside the clutch housing. Place a transmission jack or support under the transmission and remove the two upper transmission support bolts. The transmission unit may now be removed from the truck.

Drain the lubricant from the transmission case and remove the top cover. Thoroughly clean the entire unit inside and out with a suitable cleaning compound. This will facilitate work on the transmission and aid in inspecting the various parts. Engage the first and second speed gears to hold the mainshaft and remove the cotter pin and flange nut and washer from the end of the mainshaft. If the flange is tight on the splines of the mainshaft, a puller should be used to remove the flange. Remove the cap screws from the front bearing retainer and remove the main drive gear and bearing. Take out the bolts holding the rear bearing retainer in place and take off the rear bearing retainer plate. If the mainshaft forward or pocket bearing did not come out with the main drive gear, slide the bearing off the front of the mainshaft. The mainshaft may now be removed from the case by tapping on the front end of the shaft with a soft hammer.

As the mainshaft rear bearing clears the case, the sliding gears can be taken out through the top of the case. Drive out the reverse idler stub shaft with a soft bar and hammer and lift out the reverse idler gear. Drive the countershaft gear assembly to the rear and remove

(*Continued on Page* 56)

By J. EDWARD FORD

TESTING REARS ON A LATHE

Pop O'Neill gives his new mechanic some pointers

DID you ever true up a rear axle on a lathe?" asked Pop O'Neill.

"No," said Horace, the old-timer Pop had induced to interrupt his retirement long enough to help get the war won.

"That's what I always liked about you, Horace," said Pop. "You're so talkative."

"Well, I never needed a lathe to test a differential. I always done it right in the car."

"That ain't no reason to go around snappin' at people like a worried terrier."

"My back's actin' up again."

"I keep forgettin'," said Pop. "But I guess that's somethin' I'll have to put up with when I get old myself."

"Hmph. Them hardenin' arteries of yours ain't no childhood complaint."

Pop laughed. "I guess that evens up the score, Horace. Now let's see what we can do about this differential. A panel delivery came in a while ago with noisy rear. A tooth broke on the drive pinion, and another shop put in a new ring gear and pinion. I got a hunch the gear-case flange is outa true."

"You'd think," said Horace, "that the drive pinion and ring gear would always work all right. They come in matched sets."

"When you bolt the ring gear to the flange, it takes the shape of the flange, and, if that's out of true, the ring gear is bound to be. And when you get a condition like that, you're headed straight for trouble."

"You ain't tellin' me nothin'. But how are you gonna mount a thing like a gear case on a lathe?"

"Easy. We've got a set of special differential servicin' equipment down here in the tool box." Stooping, he brought out the equipment, then balanced it a piece at a time on the lathe carriage.

"We have to use these adapters," he continued, "because we want to mount the case in its own bearings. That's the way it runs in the axle and that's the way we've got to run it in the lathe if the test is goin' to mean anythin'." He picked up one of the adapters. "This one," he said, "is the centerin' cup for the headstock. The attachment bolted on it is the driver for turnin' the case. The shank has a Morse taper, so it's easy to fit it to the headstock spindle. Suppose you knock out the headstock center while I take care of the tailstock. Then we can get to work."

When Horace had slipped the centering cup into the headstock spindle, Pop picked up the two remaining pieces of equipment, a pair of accurately machined steel rings.

"These," he said, "are what we call adapter bushings. We put 'em in the centerin' cups like this, and we've got a perfect fit for the gear-case bearings. That is, we ought to have if this pair of adapter rings is right. We've got five pair altogether. That takes care of just about all the different bearin's we're likely to run across in the various differential gear cases."

He tried one bearing of the gear case in the headstock adapter ring, found that it fitted, and mounted the work.

"How are you gonna test it," asked Horace, "with a dial gage?"

"Yeah. We mount it on the tool post. But first we've got to tap the driver through one of the bolt holes on the flange." As he did this, he said to Horace: "Get me the dial gage off the bench."

When Horace returned with the gage, Pop mounted it on the tool post.

"Now," he said, as he started to turn the work by hand, "we'll see what's wrong—if anything."

"The needle's holdin' pretty steady," said Horace. But, as the

"You ain't tellin' me nothin', Pop," said Horace. "But how are you gonna mount a thing like a gear case on a lathe?"

on a method of truing up gear-case flanges that will eliminate come-backs.

work continued to turn, the needle swung off four thousandths. "Oh —oh," said Horace.

"That's what I was afraid of," said Pop. He continued to turn the case to double check on the deflection of the gage needle. "Just one low spot," he said, "but, if the ring gear was bolted to that flange, it would be enough to give us some noise and maybe somethin' a whole lot worse. We got to turn it down."

"I can do that," said Horace. "What kind of a cutter bit do you think I ought to use?"

"I think we've got just the one you need. It's ground to a narrow point. I'll get it for you in a minute. And when you start cuttin', be careful not to take any more metal than absolutely necessary. All

we're tryin' to do is true up the flange."

Horace, taking the dial gage out of the tool post, gave Pop a queer glance. "You know," he said, "these lathes are pretty handy gadgets."

"A person wouldn't think so, the way you were crabbin' just now."

"Funny," said Horace, ignoring Pop's remark, "I never thought about linin' up a differential gear case flange on one of 'em."

"That's only a start. You can true up differential drive pinions and axle shafts or anything like that. You already finished up some pistons on this lathe and cut threads on a pump shaft. Before long we'll probably get a bushing to make or some con rods to bore. Most any shop has a lathe for turnin' down armatures and undercutting the mica and truing up commutators.

"I guess you could do about everything on a lathe except grind valves."

(*Continued on page* 48)

Catherine Rihn, one of the seven apprentice mechanics employed by the Chrysler Pittsburgh Co. Her previous job was keeping house for a family that included eleven children.

Below. Steve Ference, director of service, shows Mrs. Mary Scheib how to take off a wheel.

GIRL

LARGE-SCALE employment of women as mechanics is working out with surprisingly good results at the Chrysler Pittsburgh Co., factory branch of the Chrysler Division, Chrysler Corp., according to Stewart W. Munroe, general sales manager of the Chrysler Division. After two months' experience, the management is so well-satisfied that Munroe believes the number of women mechanics will shortly be increased.

The company is employing a total of 13 women in its service and parts department. Seven are in the shop, doing maintenance and repair work exclusively. One is acting as P. and L. cashier and alternating at the counter in the retail parts store. One is the door attendant in the reception department of the service station. One is employed on the lubrication racks. One is the timekeeper in the service department. Two Negro women operate the wash rack.

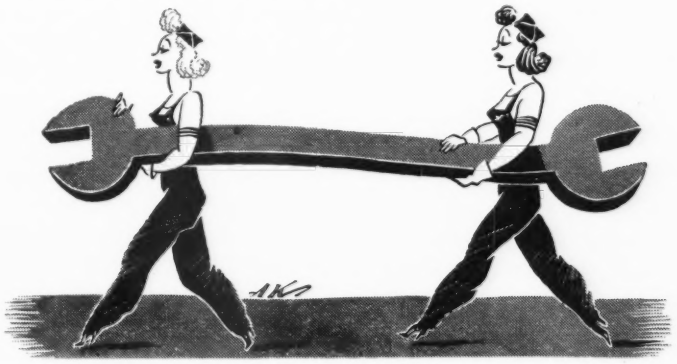
C. L. Nutter, president of the company, and Stephen Ference, director of service, have been surprised by the women's ability to absorb instruction quickly, their interest in their work, their stamina, their regularity and concentration. During their first month of employment, the girls doing mechanical work had lost only a total of one and a half days through illness or other unavoidable causes.

Credit for the courage to try this experiment on a large scale must go to Nutter. Last summer he employed the first woman ever to work in any but a clerical capacity in his service department. He engaged a school teacher as door attendant. She and the girl who succeded her left but Nutter engaged still another, who appears to be ideally qualified for the job.

The next step was to hire a girl to help out on the lubrication

MECHANICS MAKE GOOD

After brief but intensive training period, they take over full share of repair work to solve mechanic shortage problem in Pittsburgh shop



racks. The girl hired proved very quick to learn and she is now able to do as good a lubrication job as the majority of experienced men. It then was decided that women could handle the wash rack and a colored girl was hired. In general she is doing a better job than the average man in the same capacity. Nutter was so well-satisfied that he engaged a second colored woman.

Then a girl was transferred from the office to keep time and another was hired to work part time as P. and L. cashier and part as counter attendant. Both are doing excellent jobs.

Last November, Nutter decided to try out women on maintenance and repair work. He advertised in the local papers for service mechanics, either men or women. Forty-five women answered this advertisement and only a couple of men. Nutter and Ference selected seven women for a trial.

Ference was not completely sold on the idea but approached the project of training these girls with an open mind. Fortunately, he not only is an expert mechanic but possesses the rare gift of being able to teach others. To this fact, very largely, is due the excellent results achieved thus far.

Ference, deciding to start from scratch, took down a used car part by part, explaining the function of each. This elementary training lasted about 10 days. At the end of that time, the girls were far enough advanced to be put on productive labor, under the close supervision of Ference himself and two very fine mechanics.

They soon proved themselves more anxious to learn, steadier and more energetic than the average boy and they aren't handicapped by the idea that they know everything after a short time in the shop. They are more likely to stay put, once they have qualified as real production workers. Everett expresses a similar opinion and apparently is thoroughly enjoying the experience of guiding these feminine workers in their totally new activities.

Ference soon discovered that individual girls showed more aptitude on certain jobs than on others, so he assigned them to the things that they seemed to like best and consequently did best. As things now stand, two are assigned to motor tune-ups, starters, generators, and carburetors, two to engine reconditioning, and three to clutches, transmissions, brakes and front ends.

The remarkable progress that these feminine mechanics have made is best shown by the following list of operations that they were doing regularly—under the supervision of men—after only five weeks of employment:

Reline brakes, recondition wheel and master cylinder, install rear axles and oil seals, repack U joints, remove and replace transmissions, remove and replace differential carrier, remove cylinder heads and valves, remove oil pan, remove piston assemblies, tune-up engine, repair distributors, clean out and adjust carburetor, replace wheel and axle bearings, reverse flush radiators and replace necessary hoses, adjust steering gear.

In addition, they remove generators, starters, batteries, etc., and do general disassembly and assembly work. This plan enables the highly skilled mechanics to concentrate on exacting repair and adjustment jobs, instead of merely using up their time preparing the several vehicles for the actual work. It is estimated that the women mechanics can perform 80 per cent of service operations that otherwise would consume the time of experts.

At present, the girls are rated

(*Continued on Page* 75)

HOW TO ADJUST

VOLTAGE REGULATORS

An expert's method of servicing these units in a way that lets them do their best possible job

By FRED SLOANE

THE existing shortages of such parts as armatures, field coils and regulator units has vitally increased the need for correct adjustment of voltage and current regulators. An improperly set regulator can cause a lot of damage to parts that are increasingly hard to obtain.

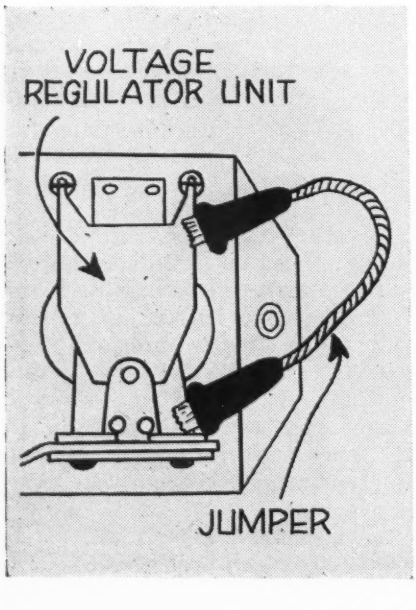
The only way you can adjust a voltage regulator so that it will function properly is by using accurate meters and equipment.

There are just two ways to go about the job of adjusting a regulator to suit the generator; you can do it with the units in place on the car, or you can do it on an up-to-date generator test bench. If the units alone are received for repair or adjustment, the job will have to be done on a test bench. If the car comes in for this service, it is practical to do the job on the car and save the labor of removing the units.

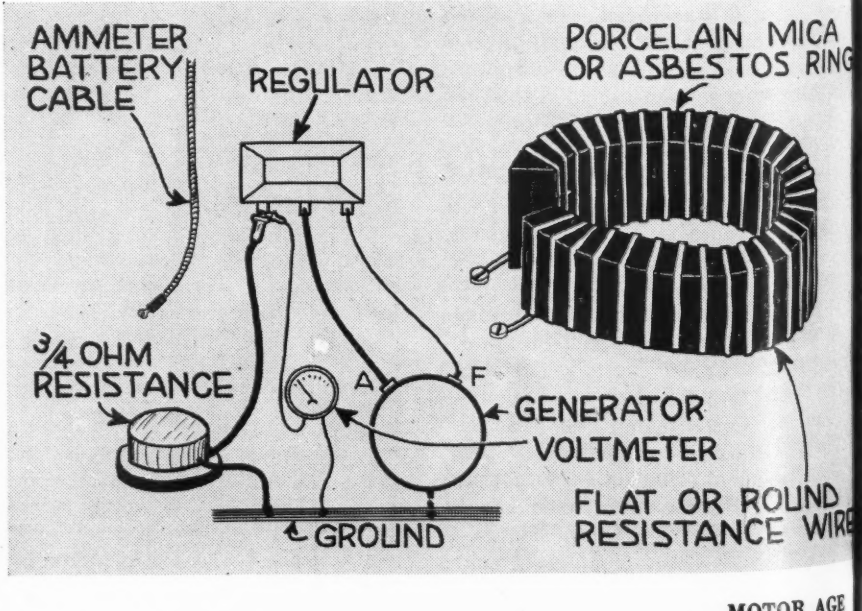
One thing can be said for doing the testing and adjusting on the test bench; it may show up defects in the car wiring system. In other words, if the generator and regulator combination operates perfectly on the test bench but won't operate satisfactorily on the car, this fact tends to show that the real cause of the trouble lies within the car wiring rather than with the regulator or generator.

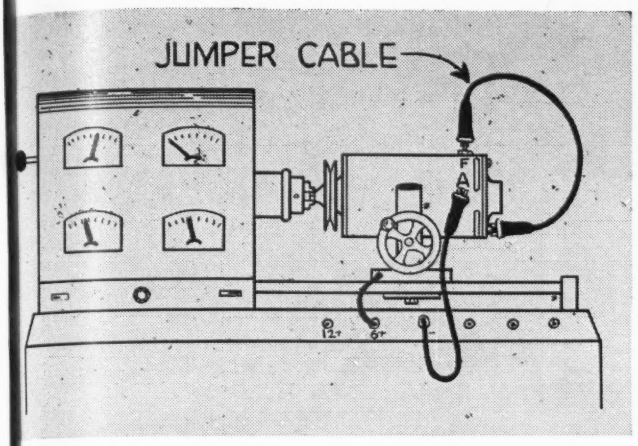
Fig. 1 shows a generator mounted in one of the later model gener-

How to block out voltage unit to help find trouble. Jumper eliminates voltage vibrator.

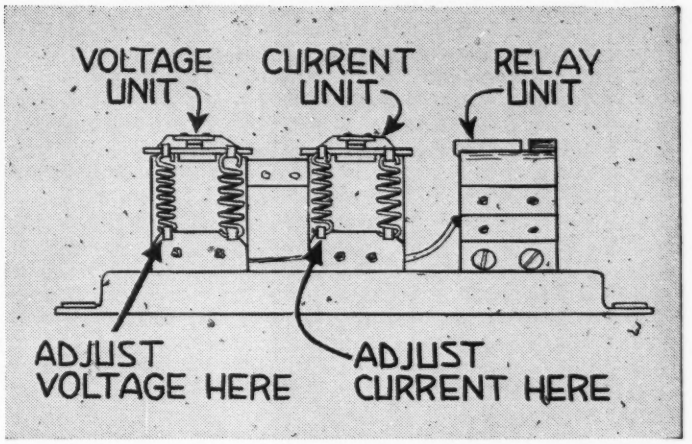


Fixed resistance method of setting voltage controls. Battery lead is disconnected and generator charges to ground throw fixed resistance. Use 3/4 ohm for a 6-volt circuit.





Up-to-date generator test bench. First step in servicing regulators is to make sure generator is delivering maximum rated charge.



Back view of a typical voltage-current regulator. The arrows indicate the points at which adjustments of the tension are made.

ator test benches. The first test should be made as shown. Operate the generator to full capacity on direct connections (without the regulator) to determine if the generator is capable of charging up to its full rated output. It is a very good idea to connect a plain relay of the right type in series with the charging line. This will make it necessary for the generator to develop full voltage in order to close the cutout contacts and become connected to the battery, which is not the case if the "hot" battery line is applied directly to the generator output terminal. Many generators will start to charge if given a "boost" with battery current, when they will not charge if a relay blocks the path.

After the peak capacity and cut-out closing tests have been made, it is time to connect the regulator to the generator and see what happens. Of course, the regulator must be connected correctly—the same as in the car—and the base of the regulator unit must be well grounded to the frame of the generator, as this ground forms a vital part of the circuits.

The preliminary running test of the generator-regulator hookup will show one of four conditions: no charge, a very low charge rate, a very high charge rate, or a charge rate that seems to be about right. Don't trust a charge rate that "seems about right"—go ahead and test anyway.

Fig. 2 shows the back view of a typical voltage-current regulator with the cover removed. If the generator won't charge through the regulator, examine the points on the voltage unit. They may be burned or oxidized or may fail to close firmly because of weak spring tension. A good way to make a quick check on these points is to by-pass them temporarily with a jumper having two clips. Fig. 3 shows this jumper in position. If the fault were in these voltage unit points, the generator should now charge at a high rate. Dirty points or a weak adjustment may also be responsible for a "low" or "erratic" charge rate, while points that are fused (shorted) together will cause a very high rate of charge.

There are two methods commonly

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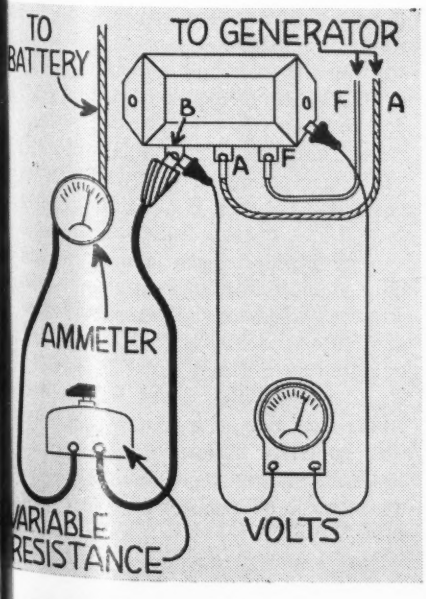
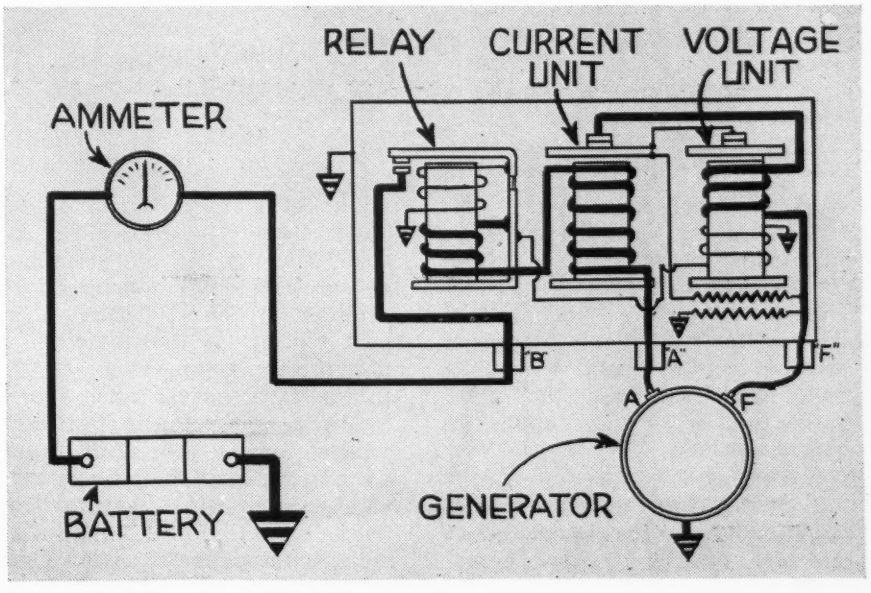
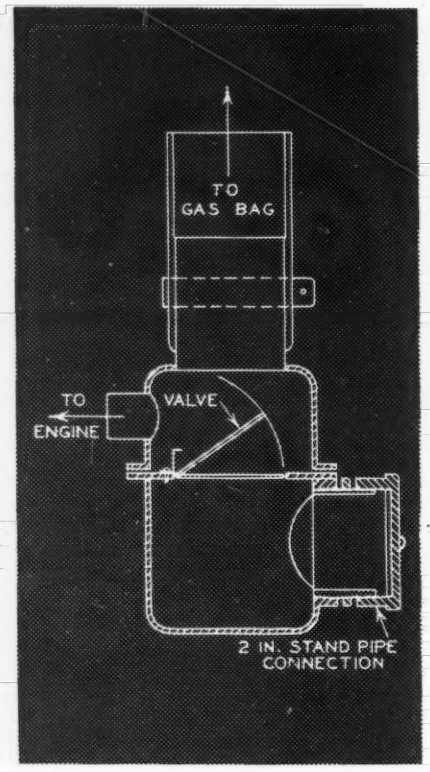
Variable type of resistance in use. Resistance is in series with the battery line.



Complete circuits of a typical three-unit current and voltage regulator. This is popular Delco-Remy type. Other makes and models, while different, follow same general principles.





Special connection for filling the gas bag.

Delivery van equipped with a town-gas container. Sometimes gas is compressed in tanks.

BRITAIN'S WARTIME

Illuminating and sewer gases keep many civilian trucks and cars on the road despite gasoline famine

WHILE producer gas is being used extensively as a substitute motor fuel in Great Britain and has received perhaps more than its share of publicity, it is by no means the only fuel being pressed into war-time service in motor vehicles. Three other alternative fuels being used more or less widely are:

1. Coal, or town, gas.
2. Sewage gas.
3. Creosote oil produced from coal tar.

Furthermore, many steam trucks and battery-operated vehicles have been dragged out of retirement, and are now doing a comparatively satisfactory job of keeping transport rolling. It thus becomes apparent that engineering resourcefulness is boundless when spurred by war-born shortages. Two examples of such resourcefulness—the use of town gas and sewage gas—will be discussed in the present article.

In Britain, the term "town gas" describes a fuel known in this country as illuminating gas, or water gas. At any rate, it is produced from coal and flows through street mains to provide cooking fuel in most modern homes and street and home illumination in some older communities.

In chemical composition, a typical British town gas differs somewhat from the water gas produced in this country and contains considerably fewer B.t.u.'s per cubic foot. The gross heat value of a typical British town gas, for example, is 500 B.t.u. per cubic foot, whereas that of carbureted water gas in America is 578. The net heat value of the British gas is 456 B.t.u. per cubic foot, compared with 529 for the American gas. Further, the flame temperature of the British gas is 3775 deg. Fahr., while that of the American gas is 4090 deg.

Nevertheless, town gas is giving

Passenger car, propelled by town gas, on a London street.

E MOTOR FUELS

a good account of itself in keeping British motor vehicles rolling.

There are two methods of using it. One is to compress it in cylinders, the other to enclose in a bag carried on the roof of the vehicle. The former method has not made great progress because of the difficulty of obtaining cylinders. The equipment consists of:

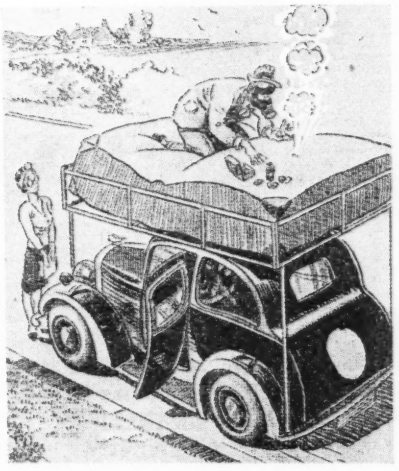
1. A battery of from three to seven storage cylinders, the number and size depending upon the maximum power output of the engine, and the range required from a single charge of gas.

2. Two pressure-reducing valves. These are designed to reduce the pressure from the storage vessel in two stages, first to about 8 lb. per sq in., and then to slightly under atmospheric pressure at the engine intake, in order to prevent flow of gas when the engine is not running.

3. Suitable control valves to enable the cylinders to be charged from bottles or a compressor at a charging station.

4. An air-gas mixing device to provide a suitable air-gas mixture at the engine intake.

5. Fitting and connecting pipes for the cylinders, and a gage on the dash to indicate the pressure in the cylinders.



A cartoonist looks at the tribulations of driving on town gas. (From The Motor, London.)

The cylinders are rigidly fitted to the chassis frame, and are arranged in parallel, the interconnections being made by seamless-drawn-steel tube.

The cylinders are constructed of nickel-chromium-molybdenum steel, and measure 5 ft. 10 in. in overall length; they are of 8 in. internal diameter and 0.22 in. in wall thickness, and they weigh 124 lb. when empty. The capacity of a cylinder is 330 cu. ft. at a working pressure of 3000 lb. per sq. in., which is equivalent to 1.30 gal. of gasoline. The type of cylinder used will rupture without fragmentation, and, for safety, cylinders are tested annually at 4500 lb. per sq. in.

Only 10 to 15 seconds are needed at a filling station for connecting up, and a battery of seven cylinders can be recharged in 4 minutes 15 seconds. The cost of compressing gas works out at about 24 cents per 1000 cu. ft. of free gas, compressed and delivered into storage at 5000 lb. per sq. in.

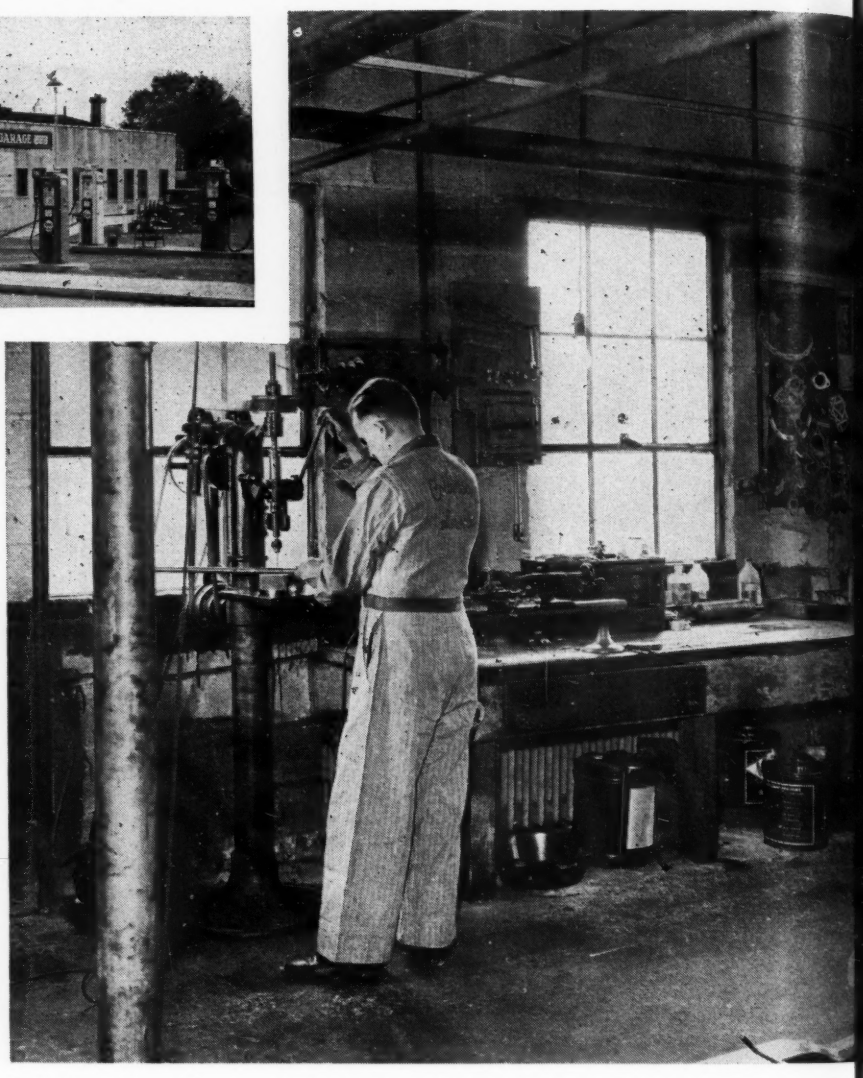
Conversion of a vehicle to the compressed-town-gas system costs around $410. Disadvantages associated with the system are the weight of the equipment and the limited range of operation, which rarely exceeds 50 miles per charge.

Enclosing the gas in a bag atop the vehicle, although rather cumbersome and inconvenient, is probably the easiest and cheapest way of changing to an alternative motor fuel. Conversions of this type involve the minimum alterations, permit the running of the engine on gas or gasoline, as desired, and cost relatively little. Simple conversions are very successful, and while optimum results are not achieved, the system affords the motorist means of increasing the use he can make of his car.

The Walsh container and equipment is probably the best apparatus of the gas-bag or low-pressure-gas type. The equipment includes frame which houses the bag. The action of the frame is governed by a system of links on the sides, together with guide cords, and the framework expands and contracts as the bag is being filled and emptied. The bags are made of a high-quality double-texture fabric with a layer of rubber sandwiched between. It has been found that about 250 cu. ft. of gas at 500 B.t.u. per cu. ft. is equivalent to 1 gal. of

(*Continued on Page* 70)

The Collinson shop at West Orange, N. J.



Collinson at the drill press, where with the aid of a homemade fixture he makes war goods.

AN INDEPENDENT GOES T

A FEW months after war began, George H. Collinson, Jr., who has operated an independent automobile repair shop at West Orange, N. J., for the last 18 years, could no longer ignore the fact that a change had come over the service business. Owners, frightened by tire freezing and the prospect of gasoline rationing, were using their cars less and buying less service. A few repairmen, succumbing to almost fantastic wages in the war plants that abound in northern New Jersey, bolted the doors of their shops.

Collinson found his own solution to the problems. He didn't wish to get out of the automobile business. It had been good to him and he liked it. In 18 years, his repair shop had given him a good living and scores of loyal customers. He owned his shop building and wished to keep it. Any solution, then, would have to be such that he could stay in the repair business.

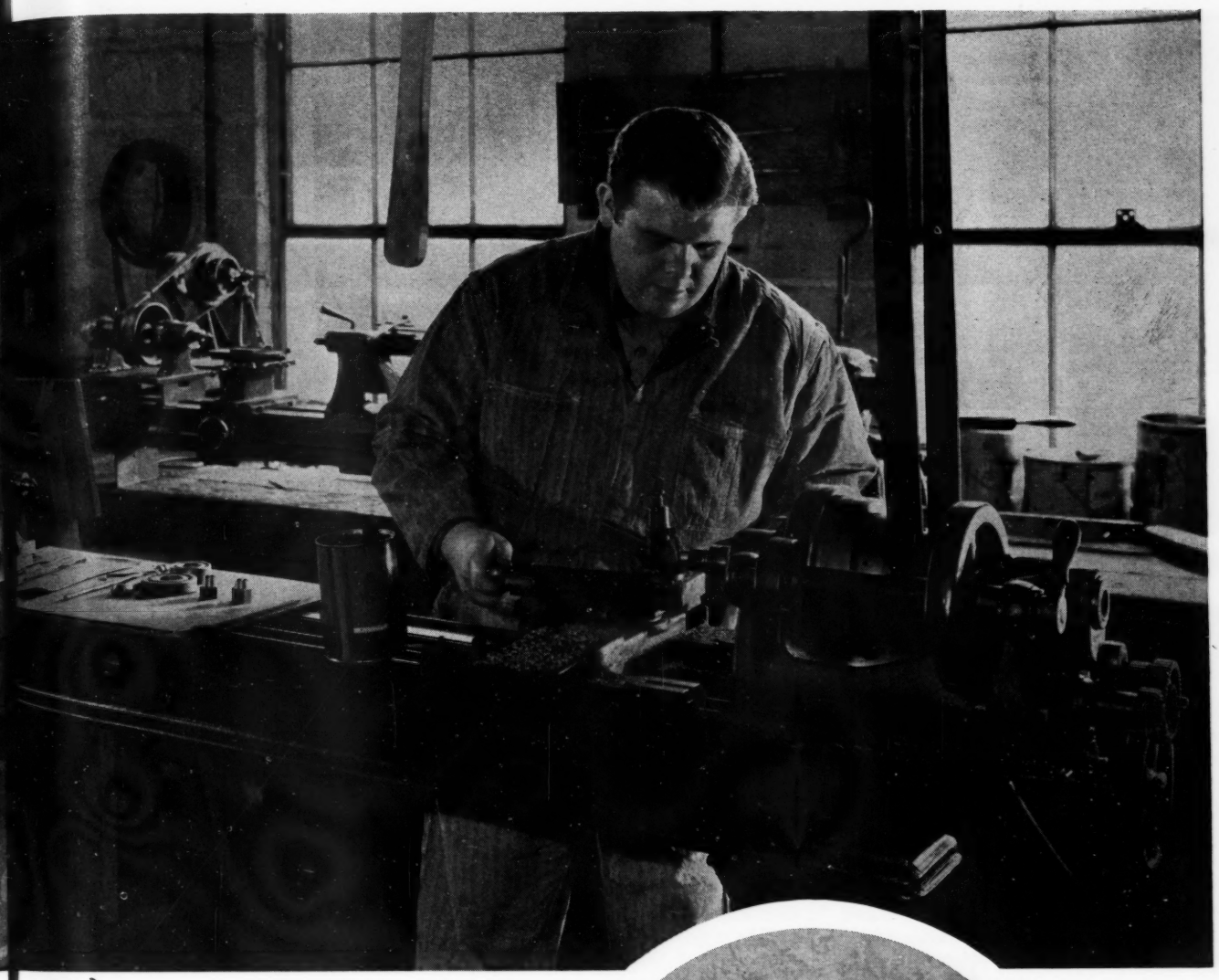
One of the first ideas to occur to him was the possibility of getting some war-production work. Chances didn't look too good, for he had no machine tools that were not used in automobile repair work. He had two bench lathes, one with a 7-in. swing, the other with an 8-in. swing, and he had a drill press.

Nevertheless, he made the rounds of several war plants. His equipment didn't impress most of the men with whom he talked. But his persistence finally paid off. He got an order for a small part he could handle on his bench lathes.

The job was simplicity itself, consisting of taking a finish taper cut on a sort of nipple, polishing the taper, and removing a burr from the other end. It required not more than a minute to complete the job. The only change necessary in the lathes was threaded arbors to take the tapped end of the part to be machined. Collinson made the arbors himself in about a half hour each.

Labor was no problem. The order wasn't large enough to demand extra men, and Collinson didn't want a big order anyhow; he wanted only enough work to fill in idle time in the shop. A former tool maker himself, he found it easy to train one of his mechanics to do the job. Once the work has been set up, the operation is almost automatic. The tolerance on the part is .010 in., so the chance of spoiling a part is slim.

Collinson realized, of course, that the job could be done faster on an engine lathe, so within a few weeks he found and purchased such a



Taking a finish cut on a small, vital part.

TO WAR

George H. Collinson, Jr.

Using ordinary shop equipment, he helps a prime contractor turn out arms for fight against Axis powers

lathe with a 12 in. swing. Now the only apparent limit to the amount of work he can produce is the ability of the prime contractor to supply the rough-finished parts.

A little later on, Collinson was offered the job of drilling 1/16 in. holes in pipes of considerable length. This was not a job for the usual repair-shop drill press, but Collinson rigged up his own simple fixture to handle the pipe and took on the work.

Keeping to his original intention, Collinson still treats the war work

(*Continued on Page* 75)

Recappers and Dealers Stock Tires Turned Over to Government by Owners

UPWARDS of 5,000,000 used tires, approximately half of the 10,000,000 collected by the government from passenger-car owners last December, will soon be finding their way into the hands of essential drivers. Amendment No. 5 to Ration Order 1A, effective Jan. 20, made it possible for recappers and tire dealers to stock both carcasses and used tires from this source. The amendment also enables dealers to obtain larger stocks Grades I and II tires and inner tubes.

A recapper, by applying to his local or state OPA office on Form R-52, may obtain 50 recappable tire carcasses for each mold he operates for recapping passenger-type tires. When he has recapped 24 out of each 50 tires, he may apply for additional allotments.

A tire repairman may obtain 25 tires that need repairs only for each passenger-car tire-vulcanizing unit he operates.

All work on casings must be completed within 30 days, unless the recapper or repairman can show sufficient reason for delay, and the quality of the work must meet OPA standards.

Tire dealers, using Form R-54, may obtain one recappable, repairable, or usable tire, whichever he prefers, for each $1,000 of his 1941 net retail and wholesale sales of passenger-type tires and tubes. He may obtain at least 12 tires regardless of his 1941 sales. He will be allocated tubes in proportion to the number of casings he receives.

Further, a tire dealer, who has previously received Grade III tires on Form R-46, may apply on Form R-54 at the same time for tubes on the basis of one passenger-car tube for each tire previously acquired. In addition, the dealer may apply for allotments of new Grade I and Grade II tires at the rate of one tire for each $2,000 of his net tire and tube sales volume for 1941, and may obtain a tube for each tire he is authorized to buy. Regardless of 1941 sales, he may receive a minimum of six Grade I or Grade II tires.

Under the provisions of the amendment, each recapper and repairer must submit to the OPA office which authorizes the allotment of his tires a monthly report showing:

1. The number of recappable and repairable tires on hand on the first day of the month; 2. The number received during the month; 3. the number processed during the month; 4. The number remaining unprocessed on the last day of the month; 5. The number of such tires sold on certificates during the month; 6. The number of processed tires on hand the last day of the month.

The report must be filed by the fifth day of the month following the period covered, and along with it the recapper or repairman is to send the parts B rationing certificates received during the month.

Parts Rated Higher

TO prevent the diversion to the armed forces of automotive replacement parts produced for civilian use, the WPB has amended Limitation Order L-158 to permit manufacturers to schedule civilian parts ahead of all production bearing AA-3 or lower priority. The amendment also provides that purchase orders from the Army, Navy, or Maritime Commission are invalid unless they bear a preference rating of AA-1 or higher.

The amendment is expected to preserve distributors' stocks for civilian use and thus relieve the shortages that have been becoming increasingly severe in certain areas and in certain classes.

Inspections Postponed

PROTESTS by owners through their clubs apparently persuaded the OPA that the schedule of tire inspections originally set up was needlessly severe. At any rate, the schedule has been considerably modified.

Holders of A ration books, who were to have had their tires inspected initially before Feb. 1, now have until March 31 to have the inspections completed. Further, the original period of four months for each subsequent inspection has been lengthened to six months. This was one of the points raised by motoring clubs, which pointed out that, under gasoline rationing, tires would have been inspected every 720 to 860 miles, which requirement they held was unnecessary.

B and C book holders have until Feb. 28 to have their tires inspected. Thereafter, B book holders must have their tires inspected every four months, and C book holders every three months.

Officially, the reason for the change in the tire-inspection program was given as a desire to prevent work peaks for inspectors by providing different deadlines for the various classes of ration-book holders.

Limit Is Raised On Farm Equipment

AFTER the Senate's Truman Committee had criticised the WPB for its handling of farm equipment manufacturing, the WPB announced Jan. 21 that production limits for the first quarter of this year had been raised 30 per cent. Chairman Nelson of the WPB called the committee's criticism unfair, but steel allotted for farm equipment for the first 1943 quarter totals 187,000 instead of 137,000 tons as originally planned.

Battery Stocks

THE limit on the number of replacement batteries that may be kept in stock by both distributors and manufacturers has been raised.

Distributors, which by WPB definition means retailers as well as jobbers, may keep an inventory equal to 90 days' supply. Last year the limit

★ WASHINGTON WHISPERS

was a 60 days' supply. A 90 days' supply is defined as the number of batteries sold by the distributor in the corresponding month of the previous year, plus his sales for the two following months of the year before.

Manufacturers may maintain an inventory equal to a 120 days' supply.

Shops May Charge More For Overtime Service

AUTOMOBILE repair shops may charge time and a half for labor when the customer requests service that must be done after regular hours and time and a half overtime pay is actually paid the mechanic doing the work.

Authorization is contained in a special interpretation by the OPA, which notes that specific authority must be given by the customer to perform the work at overtime rates. If the mechanics merely work overtime to finish a job which the customer expected would be completed during regular hours, no overtime charge may be made.

The ruling applies to shops that actually made an overtime charge for work after regular hours in March, 1942, and to shops in which no overtime was worked in that month. If the shop regularly worked overtime in March without making any distinction between its regular and overtime rates, it may not now make a higher charge for overtime labor.

Pleasure Driving Ban

PASSENGER-CAR traffic in the Eastern states slumped sharply last month after the OPA ban of Jan. 7 on all pleasure driving. Rather than ask questions to clear up the necessarily loose definition of pleasure driving, owners met the situation by leaving their cars at home except when making the most essential trips.

How much gasoline the ban saved

(*Continued on Page* 84)

★ SWAN SONG

Now that John R. Turney, developer of ODT's famous Order No. 21, has resigned from ODT to return to private law practice, there will be a decided softening of ODT's attitude towards enforcing the order. There will now be a regime of local option accompanied by a sales campaign to enlist the cooperation of truck operators and local civic organizations. Just what the local option will amount to is hard to tell because the instructions for local ODT offices are so vague that they amount to telling the local men that "us boys at headquarters could not do it; now you fellows in the branch offices try your hand at it." Add to this the fact that truck-operator cooperation is the thing ODT claimed it could not get, and the failure to get it was the reason for the order, and you have no lessening of confusion. When to this you add local organizations, such as Chambers of Commerce, fired by publicity from ODT, which might in an outburst of patriotism make their own quasi-rules, you will have to put it mildly—chaos.

However, the local ODT offices will not have the free hand that headquarters had, although much is left to their "discretion." Agriculture county agents and farm boards, as well as local OPA boards, can give the operator what ODT denies him. Operators can and are taking advantage of this and will not forget it when they again need help.

★ ORDER No. 21

Order No. 21 gave ODT a big stick which Turney and apparently Eastman thought it should have. Being ethical—if not wise—gentlemen, they served notice that they would wield the club strictly in accordance with the Marquis of Queensberry rules. Somewhere down the line, the boys either deliberately or erroneously, almost surely the latter, were not so ethical. The result was that the truck operators developed a Mahatma Gandhi philosophy of passive resistance as a defense. The trucking industry figuratively stooped over so low that it presented no anatomical portions above the belt to whack. This left ODT, which started out to look like a statue of Civic Virtue, more closely resembling The Beast, with a club poised in mid air—wishing all the while that some one would grab the club so that it could more properly assume an injured expression. Unfortunately no one wanted the club in that position.

(*Continued on Page* 54)

SAM'S
TIRE
HOSPITAL
CARROLL

NEW profit makers

PARTS TOOLS EQUIPMENT ACCESSORIES

Bear Jiffy Tire Spreader

A new product to aid in the rapid inspection of tire casings under the OPA program is offered in the Bear Jiffy Tire Spreader by the Bear Manufacturing Co., Rock Island, Ill.

The new spreader can be used on the floor, curb, or bench, thus eliminating the hoisting of heavy tires. The tire is rolled onto the spreader, grips adjusted to the tire bead, and the casing spread. Spreading mechanism is equipped with a self-locking device. The spreader is made in two models, one for passenger cars and the other for trucks and buses.

Vacudex Exhaust System

The Decker Products Co. has announced a line of muffler tail pipes and tail-pipe attachments which incorporate a device claimed to save power and gasoline. The manufacturers state that, by the use of this device, increases of as high as 1 to 4 miles per gallon of gasoline have been obtained.

The Decker Products Co. describes the device as removing the condensation quickly and preventing the formation of the acid that destroys mufflers and tail pipes. As a car moves forward, air is forced through the four tapered tubes under great wind pressure. The tubes are set at angles and in advance of each other to direct the streams of air in a curling, spiral motion and create vacuum suction.

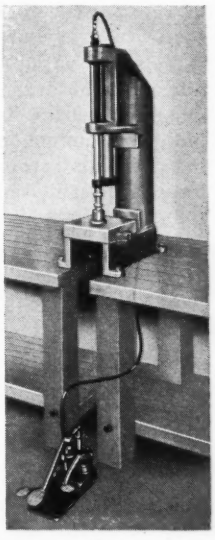
The revolving wheels of the vehicle throw air backward which enters the cones of the Vacudex with great force.

Further details may be obtained from Decker Products Co., 106 Fifth Ave., Pelham, N. Y.

Hydraulic Speedpress

A completely new Speedpress (hydraulic arbor press) has just been announced by Studebaker Machine Co., 9 South Clinton St., Chicago, Ill.

Speed unequaled by any other unit for speedpress work is claimed for the new Studebaker tool. It is entirely foot-controlled, leaving the operator's hands wholly free for the work—with the utmost safety. No hand levers are required. Women operate the new speedpress as easily and as efficiently as men.



Pressures from zero to 20,000 lbs. are obtained by the pedal of the Hydraulic Control Base which is placed in any convenient position underneath, and connected with the press by a steel tube. One movement of the applicator pedal and the ram moves downward to contact the work. Foot pressure on the booster pedal, and any holding grip desired up to 20,000 lbs. is applied. A release pedal breaks the pressure, and the ram automatically returns to the top of its travel. Release takes less than a second.

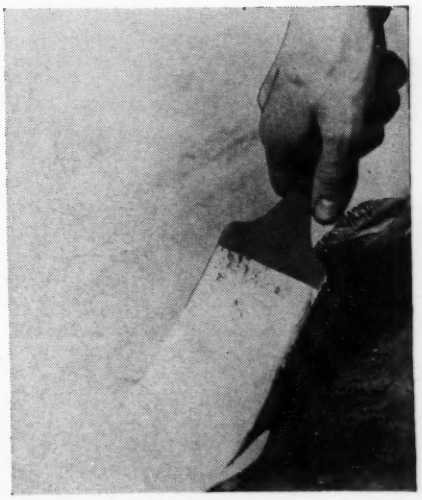
All speedpress work is handled by the new Studebaker—broaching, assembling, piercing, oil-grooving, riveting, sizing, flanging, staking, forcing, small die tryouts, forming and pressing operations, and scores of other jobs in industrial plants, machine shops, repair shops, garages, etc.

Turco Duramask

To speed up the time-wasting job of removing accumulated spillage and overspray from paint room floors, Turco Products, Inc., of Los Angeles and Chicago, has developed a new floor masking material.

This white, thick liquid looks and is handled much like paint. It can be applied to the floor with a wide brush. It quickly dries to a hard, durable, non-skid surface which cannot be injured by ordinary foot or truck traffic. When the accumulation of paint on the protective coating is so great as to require its removal, the Turco Duramask can be dissolved with water and the paint film can be mopped away.

Turco masking material is an excellent protective floor covering for garages, grease racks and machine shops. Lubricating oil, grease and machining oil are caught on the coating and prevented from seeping into the porous cement or wood floors. At intervals the spillage can be removed simply by mopping off with water. The manufacturers are Turco Products, Inc., 6135 South Central Ave., Los Angeles, Calif.



NEWS

FREEZE-UP. It is so cold along the new Alcan Highway to Alaska that the chassis grease freezes in trucks. Here an American soldier thaws a connection with blow torch.

V-SCOPE. By watching flash of passing car in new device, this Virginia state cop checks speed to see that wartime speed limit of 35 miles an hour is not exceeded by motorists.

55 PER CENT VICTORY

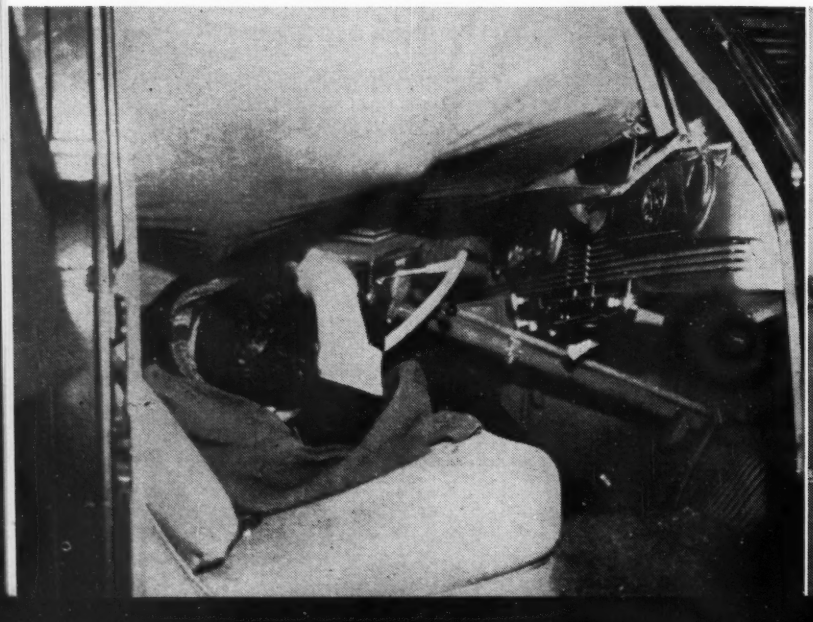
A SERIOUS set-back to the synthetic-rubber program came to light when WPB Chairman Donald Nelson announced that materials would be allotted to complete 55 per cent of the program outlined in the Baruch Committee report. This action indicated that serious shortages of rubber not only for civilian use but also for military demands would result from failure to carry through the program and carry it through on time. A slash of 45 per cent in production may delay indefinitely the attainment of the Baruch goal of supplying synthetic to everyone needing it.

Nelson's action in approving the allocation of even 55 per cent of the material needed to complete all the plants recommended came after Rubber Administrator Jeffers had lashed out heatedly at Army and Navy chiefs for trying to deny him all but a dribble of the materials needed by the synthetic program. The armed forces were for cutting the program to 25 to 35 per cent, while Jeffers insisted upon not less than 65 to 70 per cent. Nelson's action, despite his declaration that he and Jeffers do not see eye to eye on the synthetic program, rather leans in Jeffers' favor.

Despite the fact that Jeffers has not been able to do the job called for by the Baruch Committee report, he merits the whole-hearted backing of everybody concerned with rubber. His plain speaking, though called tactless by his opponents, is refreshing in a capital so permeated with evasion and buck passing as Washington. In standing up to the military in wartime, he has displayed more courage than in his tilt with the Senators over the use of rayon in tires. The military —in this or any other nation—has known only one rule; that is to take all it can get and ask for more. It takes someone like Jeffers to remind the Army and Navy, as well as bureaucrats, that wrecking civilian transport is not the way to win the war. Further restrictions on highway transport, as already suggested in some

LUCK. Pinning Orchestra Leader Apple to the seat of his car is a huge truck trailer, which upset in collision, falling on car. Sawed free by police, Apple escaped with only minor bruises.

MODEL TRANSPORT. The ricksha passenger is Elaine Shepard, a New York model. During gasoline shortage, she proposes to cover her daily modeling assignments in Chinese fashion.



DETROIT LETTER

By ED WARNER

quarters as a means of solving the rubber mix-up, would bring something dangerously close to chaos.

Kanzler Resigns

ERNEST Kanzler has been succeeded as director general for operatons of the WPB by Curtis E. Calder, president of the American and Foreign Power Co.

Kanzler, one-time Ford production chief, was named chief of the Automotive Branch of the WPB in January, 1942, and given the responsibility of supervising the conversion of the automotive industry to war production. This assignment was so well along by August that Kanzler was transferred to Washington and on Sept. 12 was made director general for operations to succeed Amory Houghton. In tendering his resignation, Kanzler pleaded ill health.

Chairman Nelson, of the WPB, in accepting the resignation, praised Kanzler for the results he has

(*Continued on Page* 40)

MILITARY aircraft comprise some of the most specialized types of war weapons being used against the enemy. Among the combat planes, there not only are fighters, bombers and observation planes, but there also are varying classes of these types. For example, there are high-level bombers, dive bombers, torpedo bombers, and patrol bombers, and then various sub-classifications, depending upon the armament, number of engines and other characteristics of the plane. Even among fighter planes of the same general class, such as the Curtiss P-40, there are a number of sub-groups which are based upon the altitude at which the plane will be called upon to carry out the special service which it has been built to perform.

An automobile has only two principal factors to consider, speed and direction, but the airplane has the added factor of altitude. An aircraft engine may be transferred within a few minutes from air at sea level-density to air of only one sixth as dense. A plane operating under desert conditions, such as those in Libya, may climb from 125 degrees fahr. at the takeoff to sub-zero conditions within a matter of minutes. The temperature is 67 degrees below zero at 35,000 ft.

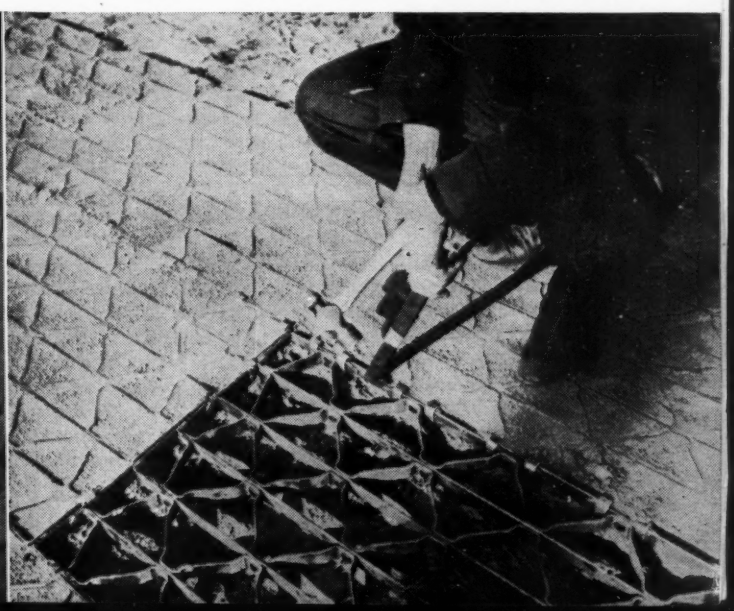
Fighter planes may be built for ground strafing of enemy troops, for mid-altitude combat, or for interception of enemy bombers at high altitudes. Speed, weight, armament, rate of climb, and maneuverability all figure in the design for such specialized planes. Thus the North American P-51 Mustang may be used for low-level attacks, the Bell P-39 Airacobra may be employed for medium-altitude operation, and the Republic P-47 Thunderbolt may be used for interception of high-level bombers. The engine is one of the most important factors in determining the performance of a plane at a particular altitude, and the addition of auxiliary equipment, such as the supercharger, has a profound effect upon engine performance.

The amount of power obtained from

(*Continued on page* 50)

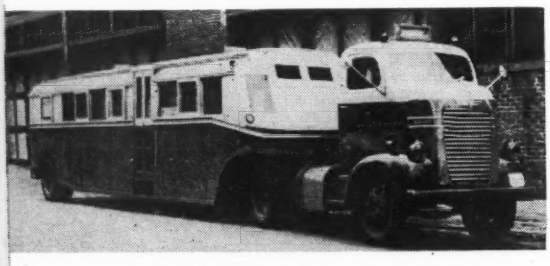
TOY WAR. Aviation cadets at San Antonio pre-flight school use tiny replicas of fighting equipment in learning how to identify both friendly and enemy equipment from the air.

SAND ROAD. Workmen for the New York manufacturer demonstrates method of laying new road. Grating, similar to that used for emergency air fields, is filled with sand and oiled.

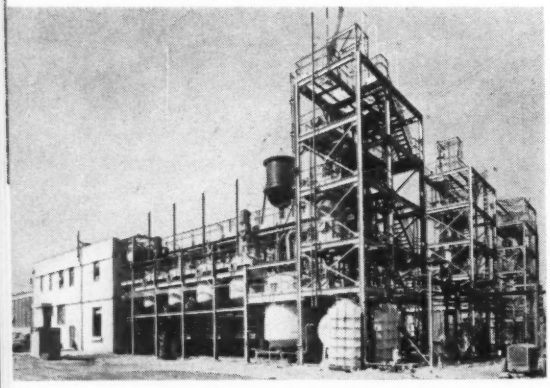


NEWS

TRAFFIC COUNTER. Device set up on highway near Washington, D. C., checks effect of gas rationing on automobile driving.



TRAILER TRICK. This comfortable bus being used at New Haven, Conn., was once a trailer, used to haul new passenger cars.



RUBBER PLANT. First section of Firestone's synthetic plant, now producing as much rubber at 100,000 acres of trees.

FOLLOW HOUNDS. Parked near New York dog show, an OPA inspector and city cop stop and check cars arriving at the show.

achieved and declared that an important assignment awaits his return to Washington.

Calder, Kanzler's successor, is a utility man of wide experience and a director of several banks and investment trusts.

SERVICING RATIONING

SERVICE shops were urged by John L. Rogers, director of the ODT Division of Motor Transport, in an adress to the Junior Traffic Club in Chicago last month to "ration their facilities and mechanics' time and to give precedence to essential transport units."

Rogers declared that the shortage of vital parts and materials is becoming worse and that an unusually large amount of truck time is being lost as a result, trucks in some cases being laid up for weeks because needed parts are not obtainable. He expressed belief, however, that the situation would improve when the Controlled Materials Plan begins to operate.

CHEAPER CARS

HENRY J. KAISER, the West Coast shipbuilding wizard, made news of a sort last month when he told a group of New York newspaper reporters that, unless the automobile industry was prepared to produce better and cheaper automobiles after the war, he would do it himself. Automobile men were not jarred off their seats; instead they invited Kaiser to have a go at the business.

Few proposals are so certain of instantaneous popular response as plans to produce better goods at lower prices. In fact, it has been the automobile industry's ability to translate this proposition into action that has accounted for its unparalleled growth. If Kaiser can match or surpass this achievement, his place in automobile manufacturing is assured.

However, it is worth noting that wars upset world economics and that post-war prices are any man's guess. The effect of World War I on automobile prices was tremendous but not in the way Kaiser suggests. In January, 1917, a Ford touring listed at $360; in January, 1920, at $525. A Cadillac seven-passenger touring listed at $2,240 in January, 1917, and in the same month of 1920 at $3490. For a Dodge touring, the figures were $785 and $1,085. Of course, these prices subsequently decreased, but it took production marvels, at least comparable to Kaiser's shipbuilding wonders, to do it.

FUEL ADJUSTMENT

FARMERS and other truck operators are urged by the ODT to apply as soon as possible to their County Farm Transportation Committees or ODT field representatives for adjustment if their fuel and mileage allotments under their Certificate of War Necessity are felt to be inadequate.

It is pointed out that no fuel coupons may be obtained from local rationing boards without a Certificate of War Necessity or authorization from the ODT stating that application for adjustment has been made.

NUGENT'S PLAN

WHEN Rolf Nugent, special advisor to the OPA, proposed some time ago a plan to sell installments certificates that would permit consumers to take delivery of goods after the war, the idea was couched in terms so general that evaluation of the plan was difficult. Now Nugent has worked out his plan in great detail, and its weaknesses become apparent.

It is claimed for the plan that it will enable the Treasury to raise great new sums to help finance the war at a cost, if the war lasts at least two years more, much lower than the cost of Series E and G bonds, and at the same time combat the tendency to inflation. Further, the plan would be expected to build up a considerable backlog of consumer demand to bolster business during the transition period between war and peace.

Under the plan, the consumer would sign an installment contract to buy a purchase certificate of a given denomination. A prospective automobile buyer might choose a $1,000 certificate. He would make a down payment to the dealer and would make regular monthly payments to the finance company or its agent. Payments would cease when he has paid $1,000 and he would then receive a purchase certificate good for $1,100 in merchandise.

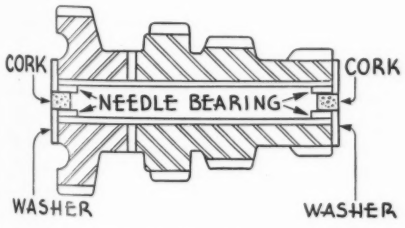
(Continued on Page 78)

★ SHOP KINKS ★

Here's your chance to pick up a little cigaret money. We'll pay five bucks ($5.00) for every Shop Kink accepted and printed. So send 'em in to us—some short cut you use in doing a job easier and quicker than the other fellow—some special tool you made when you couldn't buy one to do the job—and we'll do the rest. Incidentally we won't accept any that have previously appeared in any other automotive publication. Here are some that were accepted this month

Installing Needle Bearings

To install needle bearings in transmission countershafts, first assemble the needles to the cluster gears and then insert cork stopper inside the



needles. The corks should extend far enough out of the bearings to hold the thrust washers in place. Push the shaft through the gear cluster and the corks will be forced out.—*Henry Eastland, Oswego, Kan.*

Vacuum Distributor Nut

It is difficult to tighten the compression nut on the vacuum-brake line to the distributor on a Ford car, due to its location.

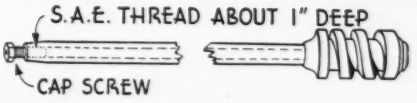
To overcome this difficulty, cut the vacuum-brake line approximately in the middle. Then, after the distributor is installed, it is necessary only to connect the two ends of the line by means of a piece of windshield-wiper hose.—*J. E. Tinkham, 502 Bellevue No., Seattle, Wash.*

Stretching Cork Gaskets

When cork gaskets are kept in stock for any length of time, they very often shrink and are unfit for use. To overcome this, we soak the gasket in water for a short period and then run it through the wringer on the garage wash rack. If a wringer is not available, an old water-pump ball-bearing shaft may be used by rolling the gasket on the bench by hand.—*Clyde C. Nicholson, 238 S. Green St., Boone, Ia.*

Steering Shaft Repair

A short time ago, one of our customers brought into the shop a steering tube with the threads on the end spoiled and part of them broken off. He wanted me to weld the piece on the end of the shaft, then build up the old threads and cut new threads over the built-up portion. Instead of doing the job as he suggested, I cut off all the old threads and then ran an S.A.E. tap down in the tube. I then took a bolt about 1 in. long and of the right thread and diameter and drilled a hole through the center for the horn



wire and the repair was complete. This tube was from a large truck and it was not possible to buy one. This repair saved the owner much grief and time in having a new one made.—*Roy T. Cross, McConnell, Ill.*

Spongy Brakes

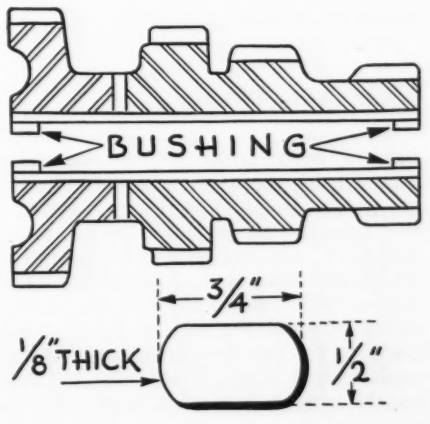
A chronic case of spongy brake pedal during warm weather was finally found to be caused by vapor lock as a result of the master cylinder and brake lines being too close to the exhaust system. The trouble was overcome by running the brake lines on the opposite side of the frame and also covering the master cylinder with sheet asbestos.—*Thomas H. Hayes, 440 S. Market, Monticello, Ill.*

Universal Joint

On earlier model Chevrolet cars, a riveted universal joint was used. Considerable time can be saved when overhauling these units by cutting the rivets and then, when reassembling, using 5/16 x 1 in. S.A.E. cap screws. insert the screws so that the nuts will be to the rear of the car, draw them up tight, and spot-weld the heads.—*Ralph Hunter, Camp Point, Ill.*

Bushing Remover

A handy tool for removing the bushings from the transmission of a Ford "60," so that the bushings may be used again, can easily be made as shown in the accompanying sketch. This same method may be applied to almost any other bushing which you do not want to destroy, since bushings are made of vital war materials and are very difficult to obtain. Simply place the countershaft half way in the gear cluster and slide the tool in the other end of the gear cluster. Bring the countershaft up against the tool and the bushing may be pressed out.—*J. E. Armbruster, 17 Raymond Ave., Shelby, Ohio.*

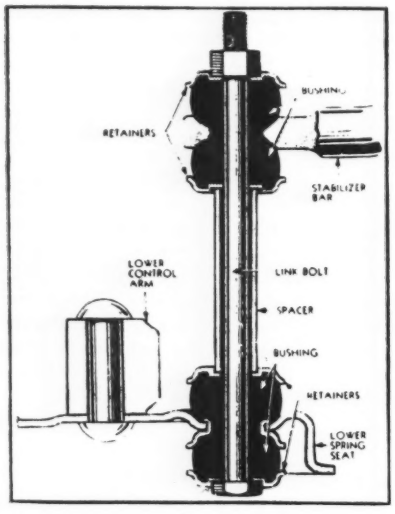


SERVICE HINTS

FROM THE FACTORIES

Assembling Stabilizer

To assure proper alignment when installing the stabilizer assembly on a 1942 Chevrolet, the wheels of the car must be on the floor supporting the weight of the car. Install the



stabilizer in the two brackets attached to the front cross member and bolt the brackets loosely. Then, with the lower retainer and one bushing assembled on the link bolt, thread the bolt through the hole in the front spring seat and then place a bushing, a retainer and the spacer sleeve on the bolt. After this has been completed, install another retainer and bushing on the bolt and thread the bolt through the eye in the stabilizer and install a bushing, a retainer, and the nut. It is essential that the nut be pulled down to the limit of the threads to prevent it from becoming loose. Then tighten the two brackets at the front cross member.

Rear Axle Noises

Too much end play in rear axles, due to wearing of differential side gear thrust washers, will cause noise on rough roads. The Buick factory, through its parts department, furnishes a spacer block for service which will take care of the two widest limits used in production. In some cases, this end play cannot be removed entirely by the installation of a new replacement block. Therefore, in such cases, new bronze side gear thrust washers should be installed back of the differential side gears and the clearance should not be more than .008 in. The right axle shafts on the series 40-50-60-70 are ¾ in. longer than on the left side, and on the 90 series 15/16 in. longer. This is due to the differential case being slightly offset to give hypoid pinion clearance.

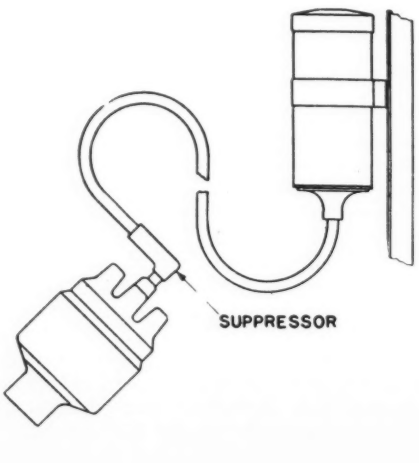
Starting Motor

The starter motor pinion on a 1942 Plymouth car, when fully engaged, should have a clearance of 1/16 in. to 3/32 in. between the pinion and the pinion housing. To check this clearance, remove the starter from the engine and, with the shifter yoke pushed back until the starting motor switch makes contact, the measurements should then be made between the end of the pinion and the thrust washer. The starting-motor switch button may be screwed in or out of the switch as required for the proper pinion adjustment.

Radio Suppressor

In placing the elbow-type suppressor in the distributor on a 1942 Oldsmobile car, it should be installed so that it points toward the battery. The coil-to-distributor wire should clear the battery, heater hose, and distributor metal parts.

Ignition noises may also result from the heater hose lying on or too close to the distributor cap. Heater hose should be installed so that it is to the one side and beneath the distributor for best results.

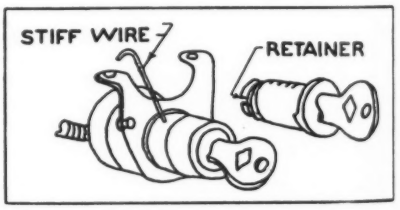


Clutch Pedal Adjustment

The clutch-pedal adjustment on 1942 Packard cars should be made by means of the adjusting nut on the pedal linkage. The clutch pedal free travel should be 1½ in. to 1¾ in. on the semi-centrifugal clutch, and 2 in. on the electromatic-equipped cars. This measurement should be taken from the pedal pad to the floor board.

Ignition Switch Lock

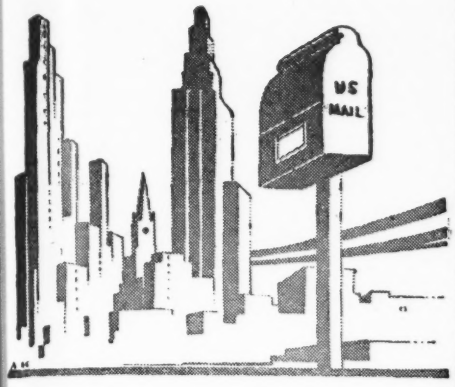
The ignition switch lock on a 1942 Hudson car can be removed from the lock cylinder by inserting the key in the switch and turning the key to the right, or on, position. Then depress the lock cylinder spring retainer with a pointed tool or a piece of wire 1/16 in. in diameter by inserting it in the small hole in the barrel of the lock in front of the bracket legs, which are bolted to the ledge of the instrument panel. Turn the key clockwise and the cylinder can then be removed

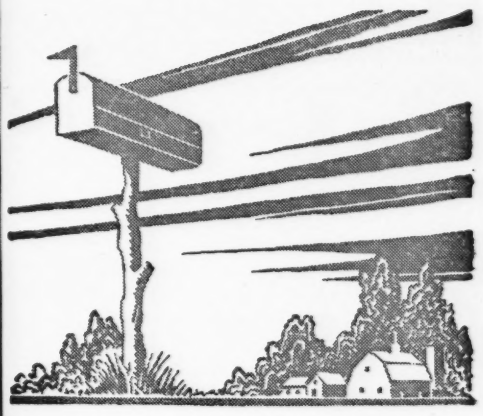


from the lock. The cylinder can be replaced by inserting it in the barrel of the lock with the key in on position and then turning the key to off position.

Thermostat

Overheating motor and water loss in some cases is caused by the failure of the thermostat to open. The purpose of a thermostat is to limit the flow of water through the cooling system during the warming-up period. As the temperature of the water increases, the thermostat starts to open slowly and is in full open position when the motor reaches the temperature of efficient engine operation. The thermostat valve starts to open at 151 to 155 degrees on a 1942 Studebaker car. When installing a thermostat, the end carrying the bellows must be placed in the downward position, as reversing the thermostat will make it inoperative and cause overheating.





Bill Toboldt, Editor, Motor Age

THE READERS'

CLEARING HOUSE

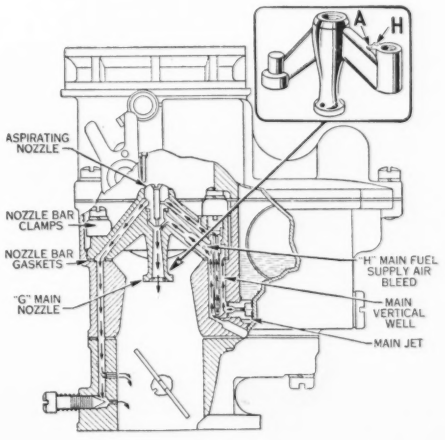
of Servicemen's Queries

Boosting Mileage

I am writing in regard to the 1942 Ford V-8. I have had several in the shop in the last few weeks for a tune-up. The customer wants more pep and gas mileage. I have overhauled the distributor and carburetor, cleaned and spaced the plugs and have done everything I know, but all this didn't do any good. Could you give me any information on this? —James D. Wilson, Cuyahoga Falls, Ohio.

TO get the best mileage out of a Ford, or any other car as far as that goes, start from scratch and give it a good carbon and valve job. That doesn't mean just reface the valves and cut new seats, but it means, after refacing the valves and cutting the seats, to lap each of the valves in with find compound to be sure of a good seat and then check each of the seats with Prussian blue or with the pencil-mark test. That's what they do on aviation engines in order to insure top performance. Having made sure that your compression is okay, and also that the rings are in pretty fair shape, you can then get to work on the distributor and carburetor.

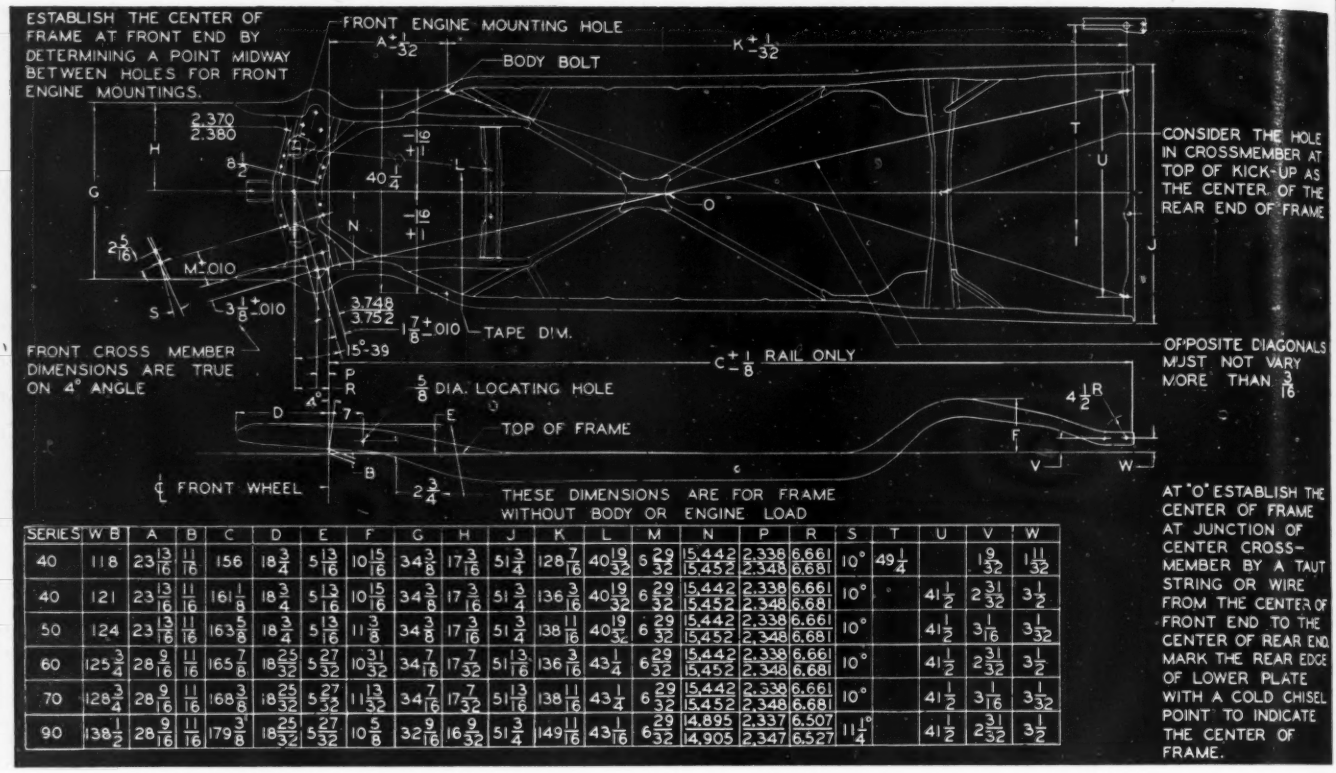
On the Fords, you will find that best results are usually obtained with the spark adjusted to full advance position and the vacuum advance backed all the way out. Then, if it pings under that setting, it is best to ease off on the advance just enough to remove the ping. Of course, you should use new breaker points.



On the carburetor, be sure all the passages are clean and only a little performance will be sacrificed if you go to one size smaller main jets. If the owner is willing to baby the job a bit when accelerating, you can also disconnect the accelerating pump link. However, most owners won't put up with that, so the best you can do there is to put it in the winter, or short stroke, adjustment.

Be sure that both idle adjusting screws are adjusted so that mixtures of equal richness is supplied to both carburetor throats. An easy way of doing this is to turn the adjustments all the way in and then solder an indicating needle to the heads of the screws. By keeping these needles in the same relative positions, equal adjustments will be obtained.

By all means, change to S.A.E. 10 oil as this will help your mileage considerably. Also make sure that transmission and rear axle are filled with winter grade lubricant. Also make sure that wheels, both front and rear, are in correct alignment and that brakes are not dragging. If the owner does most of the driving in the country where there is very little


ESTABLISH THE CENTER OF FRAME AT FRONT END BY DETERMINING A POINT MIDWAY BETWEEN HOLES FOR FRONT ENGINE MOUNTINGS.
FRONT ENGINE MOUNTING HOLE
BODY BOLT
CONSIDER THE HOLE IN CROSSMEMBER AT TOP OF KICK-UP AS THE CENTER OF THE REAR END OF FRAME
OPPOSITE DIAGONALS MUST NOT VARY MORE THAN 3/16
FRONT CROSS MEMBER DIMENSIONS ARE TRUE ON 4° ANGLE
5/8 DIA. LOCATING HOLE
TOP OF FRAME
RAIL ONLY
TAPE DIM.
℄ FRONT WHEEL
THESE DIMENSIONS ARE FOR FRAME WITHOUT BODY OR ENGINE LOAD
AT "O" ESTABLISH THE CENTER OF FRAME AT JUNCTION OF CENTER CROSS-MEMBER BY A TAUT STRING OR WIRE FROM THE CENTER OF FRONT END TO THE CENTER OF REAR END. MARK THE REAR EDGE OF LOWER PLATE WITH A COLD CHISEL POINT TO INDICATE THE CENTER OF FRAME.

SERIES	W B	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
40	118	23 13/16	11/16	156	18 3/4	5 13/16	10 15/16	34 3/8	17 3/16	51 3/4	128 7/16	40 19/32	6 29/32	15.442 15.452	2.338 2.348	6.661 6.681	10°	49 1/4		1 9/32	1 11/32
40	121	23 13/16	11/16	161 1/8	18 3/4	5 13/16	10 15/16	34 3/8	17 3/16	51 3/4	136 3/16	40 19/32	6 29/32	15.442 15.452	2.338 2.348	6.661 6.681	10°		41 1/2	2 31/32	3 1/2
50	124	23 13/16	11/16	163 5/8	18 3/4	5 13/16	11 3/8	34 3/8	17 3/16	51 3/4	138 11/16	40 19/32	6 29/32	15.442 15.452	2.338 2.348	6.661 6.681	10°		41 1/2	3 1/16	3 1/32
60	125 3/4	28 9/16	11/16	165 7/8	18 25/32	5 27/32	10 31/32	34 7/16	17 7/32	51 13/16	136 3/16	43 1/4	6 29/32	15.442 15.452	2.338 2.348	6.661 6.681	10°		41 1/2	2 31/32	3 1/2
70	128 3/4	28 9/16	11/16	168 3/8	18 25/32	5 27/32	11 13/32	34 7/16	17 7/32	51 13/16	138 11/16	43 1/4	6 29/32	15.442 15.452	2.338 2.348	6.661 6.681	10°		41 1/2	3 1/16	3 1/32
90	138 1/2	28 9/16	11/16	179 3/8	18 25/32	5 27/32	10 5/8	32 9/16	16 9/32	51 3/4	149 11/16	43 1/16	6 29/32	14.895 14.905	2.337 2.347	6.507 6.527	11 1/4°		41 1/2	2 31/32	3 1/2

Frame Diagram, 1942 Buick Series 40

traffic, you can also gain a fraction of a mile per gallon by removing the fan blade. This can also be done in the winter for metropolitan traffic driving but, during the summer, he would probably need the fan.

A slight increase in fuel economy can also be obtained by increasing the spark plug gaps a few thousandths.

Water in Gas

What causes some cars to accumulate so much water in the gas tank? The one that's bothering now is a LaSalle, 1940 model. If alcohol is added to gas tank, will this help get it through the carburetor and fuel pump O.K.?—Delos Thaler, Hart, Mich.

ON the accumulation of water in the gas tank, for the most part, this is pumped in with the gasoline and, if it is a bad condition, I suggest that you advise the car owner to purchase his gas from another supplier. As you know, most gas companies come around to the various filling stations periodically and pump out the water from the tanks which gets there through condensation.

I would recommend that you completely drain the fuel tank on the LaSalle, blow out the fuel line, and clean the fuel strainer. In addition, it might be well to install an additional fuel strainer in the line to make sure that you have one of the latest types which will prevent passage of water onto the carburetor.

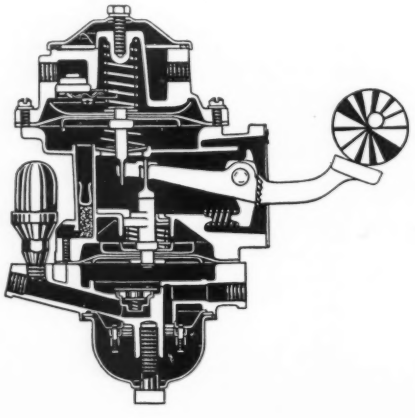
It occurs to me that there is a possibility that the water might be coming into the tank due to a defective connection between the tank itself and the filler pipe. Many cars, as you know, have the two connected by means of a rubber hose, and there have been occasions when these hoses have broken and water can then splash into the tank. However, this is rather unusual and I mention it just to be sure you cover it.

Oil Burner

This is in reference to a 1941 model 44C Buick. At 33,000 miles I had a complete overhaul job done on it. New rings, carbon and valve, water pump and fuel pump. This job was guaranteed. It still burned oil; in fact, it burned more oil than it had been before being overhauled. Since then, three more ring jobs have been performed on the same motor but to no avail.

Even the inlet hole and outlet holes in the distributor shaft were either drilled out or plugged according to its requirements. There are no leaks around the motor whatsoever. I was advised to write you.

This car has now got 47,000 miles and it burns about 1 qt. of oil to every 150-200 miles.—Frank D. Coviello, Mt. Kisco, N. Y.



I AM quite sure the difficulty you are experiencing on the 1941 Buick is caused by a defective diaphragm on the vacuum pump portion of your fuel pump. When these diaphragms are split, oil is drawn directly from the crankcase into the intake manifold, resulting in excessive fuel consumption such as you describe. To test this, disconnect the tubing leading from the fuel pump to the intake manifold and then with the engine running oil vapor should come out of the tubing.

If this proves not to be the case, you have undoubtedly slipped up somewhere in doing the repairs you have outlined.

Breaks Valve Springs

I am having trouble with a '39 Lincoln-Zephyr. This car has been breaking valve springs and, on one occasion, snapped the head off a valve, as well as breaking the plunger in the hydraulic lifter.

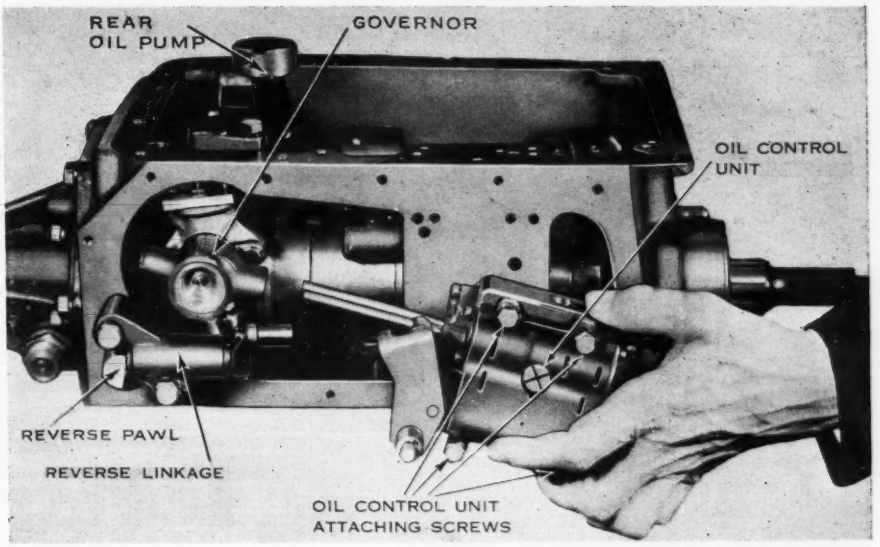
There was no trouble until the car was two years old, then it broke two

springs. We installed all new springs in March, 1942, and in the last three weeks four more springs have broken. I am at a loss to know what is causing the trouble.

This is what we have found whenever we worked on this car: First, each spring which has broken, broke between the second and third coil from the bottom. Second, there seems to be more than a normal amount of moisture in the spring valley and there are rust spots on some of the springs. Of course, I should explain this car was run last summer without thermostats, but I installed these a month or so ago. I have also noticed that the springs seemed to be peculiarly constructed. That is, instead of the coil ends being opposite each other, they are not over a quarter way from each other. This, I have noticed, has a tendency to cause a gap between the spring and horseshoe. Would this cause the spring to twist, which in time would cause it to snap?—Calvin Russell, Bellefonte, Pa.

THE trouble you are having with the 1939 Lincoln Zephyr breaking valve springs is due to the formation of excessive moisture in the valve chamber. One of the products of combustion in an engine is water and, when combined with exhaust gases and oil, it forms a rather powerful acid which attacks the metal in the springs, forming pitting and rusting, which in turn weakens the spring to the point where it breaks.

I would suggest that you thoroughly clean the breather and check the engine for excessive blow-by. It may be necessary to correct the blow-by condition before finally getting rid of your trouble. However, I would try the breather first.



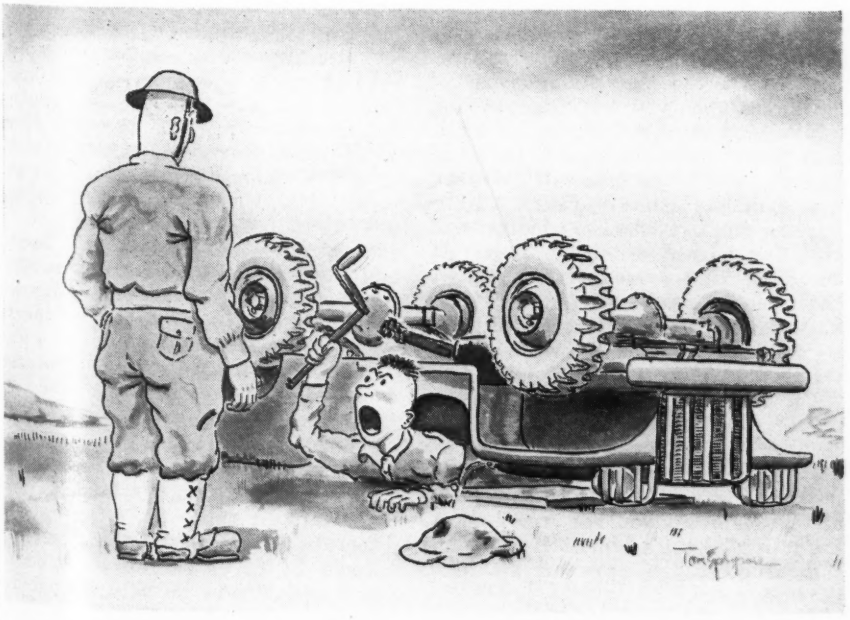
Automatic Drive

I have a 1941 Oldsmobile 6, Hydra-matic drive in the shop. In starting this car, say a morning when it is cold, I have to let the motor warm up quite a bit before it will take hold in reverse to back out of the garage; in other words, I have to race the motor before the car will move in reverse. After driving it for a few miles, and the motor and the Hydra-matic get warmed up, then it will move either in reverse or forward at the least touch of the gas.

Is this the nature of these transmissions or do I happen to have one that does not want to take hold at first before warming up?—Alva J. Rush, Greenland, Ark.

I AM quite sure you will find the difficulty you are experiencing with the Oldsmobile Hydra-matic transmission is a result of gum formation, which causes sluggish operation of the valve in the transmission. This gum formation is the result of failure to drain the fluid from the unit at specified intervals, with the result that the oil gets gummy, clogging up the small passageways and slowing up the operation of the valves.

To overcome this difficulty, completely drain the lubricant from the transmission and put in 6 qts. of lacquer thinner. Then with the rear wheels jacked up, run the engine for about five minutes in gear and vary the speed so as to go through all the different gears. Then remove the plugs and drain for at least two hours so as to give plenty of time for the thinner to evaporate. Replace the drain plugs and refill with the regular Hydra-matic transmission fluid. I am quite sure that, after you have done this, you will have no further difficulty with the unit.



"Listen, stupid! When I tell you to turn it over, I mean the engine—with this!"

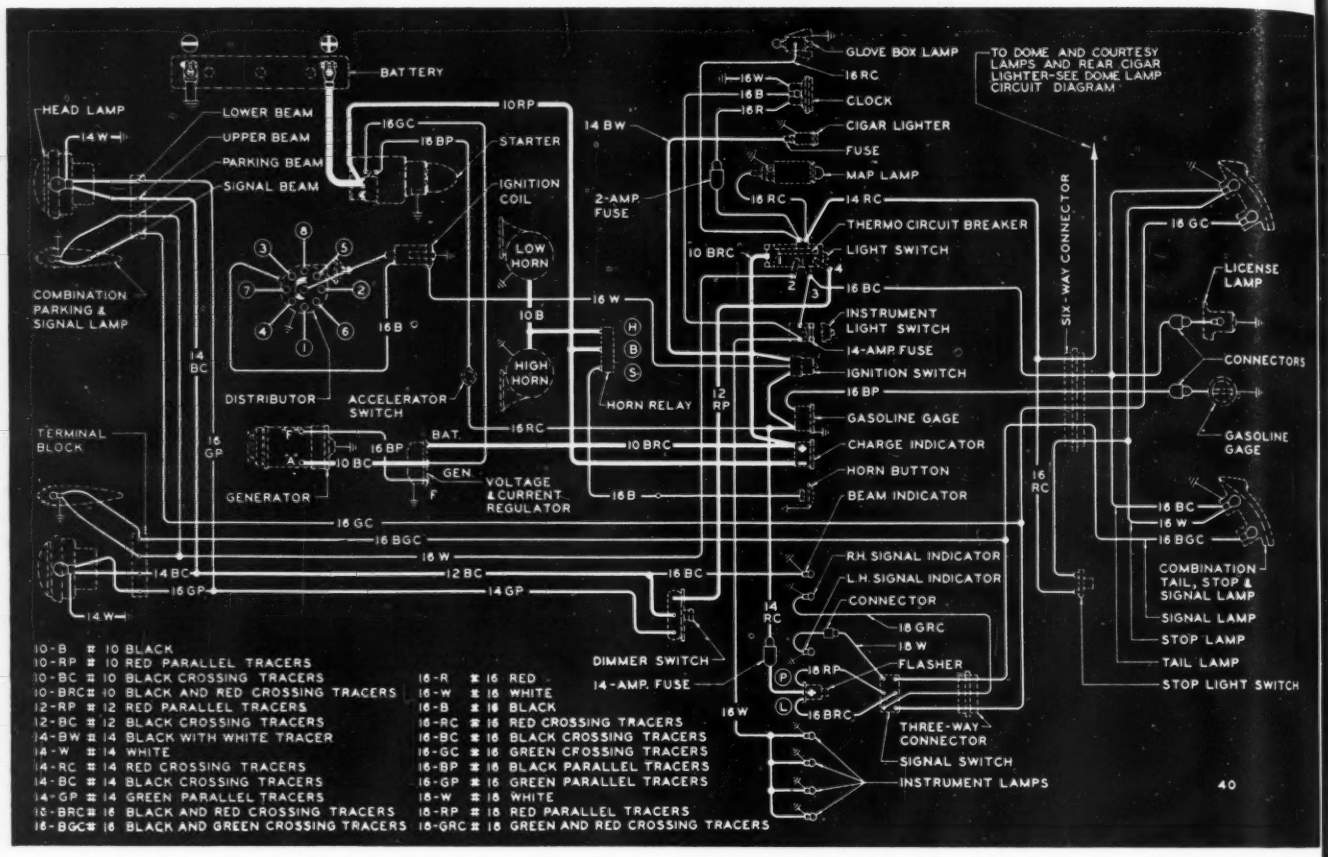
Poor Mileage

A '36 Lafayette in the shop is giving us considerable trouble. It has very low gas mileage, about 10 to 12 miles to the gallon. I have checked ignition, plugs, valve timing, fuel pump, and carburetor several times with no results. I have also installed new Stromberg carburetor and have tried several different sizes of jets without success.

This car has about 60,000 miles but it has been this way since it was practically new. Compression is up to normal on all cylinders. The motor has never been overhauled but is still in good condition and uses little oil. It has been checked at various speeds for mileage. Can you please tell me where the trouble is?—E. K. Ervine, Tampa, Fla.

THERE are many factors which enter into the trouble you are having with low gas mileage on the 1936 Lafayette.

I would suggest that you examine



Wiring Diagram, 1942 Buick Series 40

the thermostat to be sure that the engine is operating at the correct temperature. Next give the valves the correct clearance, which should be .015 in. hot. Then check the fuel pump pressure, which should not exceed 3 lb. with the float level 5/8 in. below the edge of the float bowl. I would also suggest that you check the car for tight wheel bearings and dragging brakes, as either condition could impose an additional load on the engine, which could account for poor gas mileage.

Valve Trouble

I am having some trouble with the valves on a 1939 Ford V-8 pick-up. I have done dozens of Ford valve jobs, but this is the first one to give any trouble.

Last June, I refaced the valves and honed the seats on this job. I put in all new springs and guides. The exhaust valves were burned out on Nos. 2 and 6 cylinders. Last December I did the valves again and found the same valves burned.

I use the Ford formula for setting the cam and giving three separate grindings to get all the valves. I gave them all .013 clearance.

Now this car has 85 lbs. compression on all cylinders. The vacuum reading is 15 to 18 fluctuating. On my motor analyzer I can watch the fire on the spark plugs. They all have fire to the plugs, and yet I can cut the fire off of No. 2 and 6 or one at a time and it doesn't affect the motor running at all. New plugs have been put in and still the fire isn't going through.

I have synchronized the distributor, checked the wiring, checked the distributor caps and cleaned the carburetor and tried a new carburetor on it. Could it be intake manifold?—Sparks Garage, Avenal, Cal.

I THINK the most likely cause of the trouble you are experiencing on the 1939 Ford pick-up, is a warped manifold or defective manifold gasket, which permits air to leak into cylinders 2 and 6, thereby diluting the mixture which of course, will result in burned exhaust valves. At the same time I would also suggest that you make a careful check of the vacuum line to the automatic advance to make sure there are no leaks at the fittings or in the line itself.

On the Ford it is rather difficult to see the edges of the manifold as they are hidden by the ignition conduit. However, you might try pouring a little gasoline along the edge of the manifold and see if it affects the idling of the engine. If you find that it does, you have an air leak at that point.

There is also a possibility that you have some sticking valves and, since the compression pressure is down to 85 lb. when it should be about 100 to 110 lb., I would suggest that you give this engine a good carbon and valve job. I would also recommend that you pay particular attention to the adjustment of the carburetor. Be sure that both idle adjusting screws are adjusted equally so that the same amount of fuel is supplied to both carburetor throats. In other words, both idle adjusting screws should be turned out the same amount.

Halving Cylinders

In the September Issue of Motor Age, *you have an article "Halving Cylinders to Save Gas." I have a '33 Chevrolet in the shop that has a broken piston in No. 1 cylinder. The cylinder wall and crankshaft bearing are ruined. I would like to know if I can leave out No. 1 entirely and what else I would have to do to convert this into a three-cylinder job. Please send me diagrams of the procedure in this case, if you think it can be done.—Deerfield Garage, South Deerfield, N. H.*

ON your 1933 Chevrolet, the simplest thing to do in order to operate this engine on three cylinders would be to operate it on cylinders 4, 5 and 6. To do this, do not disconnect the wires from the spark plugs but simply close the gap on spark plugs 1, 2 and 3. In addition,

remove the push rods from the three front cylinders so that the valves will not operate. It also would be advisable to install a blind manifold gasket for the front three cylinders, though this latter suggestion is not imperative.

It is best to leave the pistons and connecting rods in position for, if you remove them, it will result in considerable unbalance and a lot of engine vibration. However, at low speeds up to about 25 m.p.h. I do not think that this vibration would be noticeable and you would obtain some additional improvement in gasoline economy if the pistons and connecting rods for cylinders 1, 2 and 3 were removed.

Carburetor Flat Spot

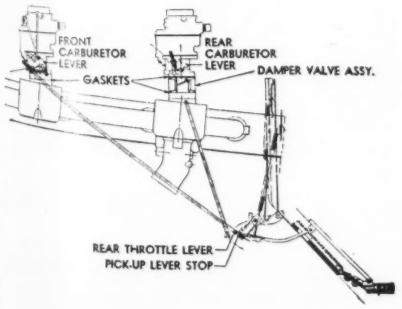
Would like to know if you have any information on how to take a flat spot out of a Carter Carburetor on '41 Buicks. I work in a Buick shop and have cleaned carburetors and installed new parts but still get a flat spot at low speeds. For instance, driving along about 13 m.p.h. and I step on the foot accelerator, it sort of hesitates.—Thomas Nagle, Collegeville, R.D. No. 1, Pa.

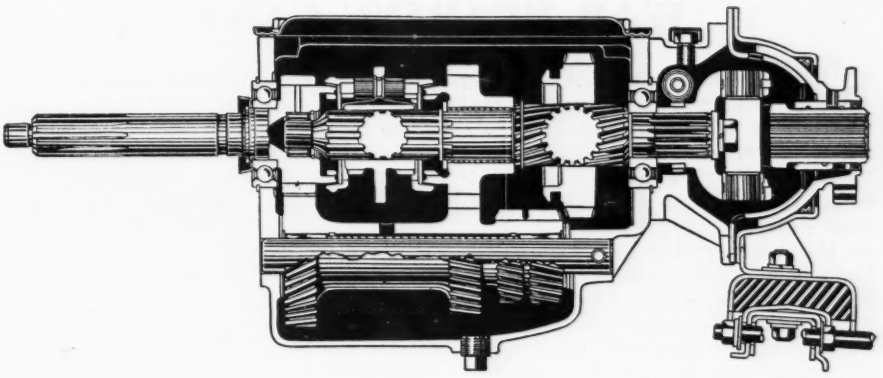
IF you are absolutely sure that the carburetor is in perfect condition, I am inclined to think that the difficulty is in the adjustment you have made of the carburetor linkage.

However, before working on that, I would like to point out that the trouble has been overcome by adjusting the carburetor on the rich side. This applies particularly to the adjustment of the metering rod.

This flat spot might also be caused by a defective check valve in the manifold drain. You will find this drain right alongside the hot spot, directly under the carburetor and, unless this check is seating tightly, you might be drawing excess air into the manifold, which would of course, result in the flat spot. In this connection, I would like to point out that some mechanics remove this check valve completely and install a plug in its place.

I would also suggest that you check the points and plugs. The points should be set to .015 in. gap and the plugs to .025 in. gap.





Jumping Out of Gear

I have read your Clearing House for years and have found it very interesting and constructive. In reading the January issue today, I find on page 46, that you have an inquiry from Lee H. Swedburg, of Minneapolis, concerning a 1939-60 Buick which jumps out of gear.

I believe that if Mr. Swedburg will carefully check the second and high shift yoke he will find it has worn considerably where it goes over the synchronizing drum. This worn condition will allow enough play so that the shift rail will not stop in the correct position for the locking ball or speed finder to rest in the recess in the shift rail. Consequently it will snap out of gear very easily.

Replacing the shifter yoke will undoubtedly overcome the tendency to jump out of gear. We have replaced several of these parts and find it always works if you do not have a tapered tooth condition. For your information the Buick group and part numbers are: Group 4.303, Part No. 1308182.—Ed Marean, Endicott, N. Y.

Engine Temperatures

Please furnish me with the following information, or advise me where I might be able to obtain same:

What is the average temperature inside the cylinder of an average 6-cylinder automobile engine doing an ordinary day's work?

(1) Suction stroke
(2) Compression stroke
(3) Firing stroke
(4) Exhaust stroke
(5) Exhaust manifold temperature.

—F. P. Roumillat, Orlando, Fla.

TEMPERATURES with an internal combustion engine vary considerably throughout the different strokes. In the suction stroke, the temperature starts at 1112 degrees Fahr. and then drops to 482 degrees. The compression stroke temperatures range from 482 degrees to 3272 degrees Fahr. During the firing stroke the temperatures then drop to 1472 degrees Fahr. and the exhaust stroke the temperature drops still further to 1112 degrees Fahr. Exhaust manifold temperatures range from 572 degrees Fahr. to 1022 degrees Fahr.

Of course, you understand that these temperatures vary considerably with different engines, carburetor adjustments, timing, fuel, compression ratio, etc. But the data given are representative of a modern engine

Hard Starting

I am writing to get some information on a 1940 Dodge. This car is hard to start. I installed new points and condenser and plugs; also cleaned carburetor and set float level. All adjustments of points, carburetor and timing were made with motor analyzers but I haven't helped this car yet. Could you give me a lead that might solve this problem?—Frank Bugard, Peoria, Ill.

THERE are several points you might check on your 1940 Dodge, which is giving you trouble with hard starting. First of all, I would suggest that you use S.A.E. 10 oil in this car and also make sure that your battery is fully charged and that all connections are good and clean. While you have installed new breaker points, you make no mention of having checked the distributor shaft bushing for excessive wear. If there is a lot of play at this point, you'll undoubtedly have hard starting.

I would also suggest that you make a careful check of the automatic advance so as to be sure there are no leaks in the vacuum line. Also make sure that there are no leaks in the vacuum line going to the windshield wipers.

Check the valve clearances and set the inlet valves to .006 in. and the exhaust valves to .008 in. with the engine hot.

There is also a possibility that the automatic choke is not operating correctly so that you are getting too rich or too lean a mixture. In this connection, you might remove the air cleaner so as to observe the action of the automatic choke.

WAR BEARING CARE

REDUCTION in the octane rating of gasoline and governmental restrictions in the use of cadmium, nickel, silver and tin, have combined to reduce the life of some replacement rod bearings, it is reported. This difficulty is most apt to occur on the bearings used in high-speed, high-compression engines which are being used in heavy truck service. As an example, one fleet of buses which normally obtained 25,000 miles of service from the pre-war connecting-rod bearings found that, under present-day conditions, trouble would be experienced at 1500 miles. And the trouble is limited to rod bearings. No difficulty has been experienced with main bearing.

As a result of the government ban on the usual bearing metals, the industry was forced to use other softer metals, which have proved highly successful except in a few instances where the engines were subject to full load conditions for long periods. As previously mentioned, the condition is aggravated by the reduction in octane rating to an average of 72 for standard fuels. Naturally, this represents quite a drop and the resulting detonation increased the load on pistons, wrist pins and bearings.

As most engines have been designed to use bearings of hard material and fuel of at least 75 octane it can readily be appreciated that bearing loads would be increased and their life shortened.

To overcome this condition, the first tendency is to retard the spark timing. However, in addition to reducing the power and economy of the engine, this procedure often results in overheating. One of the bearing manufacturers, therefore, advises that the best results are obtained by the installation of cylinder heads of lower compression ratio or, if these are not advisable, two cylinder-head gaskets can be installed. The spark should then be timed on the road and not in accordance with factory timing marks.

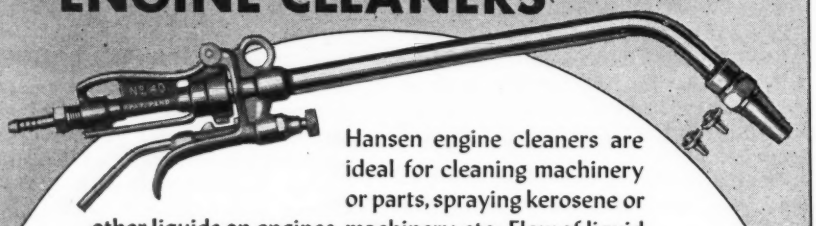
Of equal importance is the engine oil pressure. On Ford engines, the oil relief spring should be increased in length to 2 in. This should provide 20 lb. pressure at idling speed.

Due to the softness of the wartime bearing, there is a tendency for hard foreign particles to embed themselves in the bearing. These then act as a lap, or abrasive, on the crankshaft journal which soon is worn to a taper and out-of-round. It is, therefore, advisable to change crankcase oil frequently, and replace oil filter units at regular mileage intervals to insure clean oil. A bearing manufacturer also advises the use of heavier oils to provide a greater cushion for the sharper and heavier loads.

When installing the wartime bearings, a tension wrench should be used and crankshaft journals should be checked, even after regrinding, as taper and out-of-round are very critical. Especial care must be exercised against dirt when rebuilding an engine.

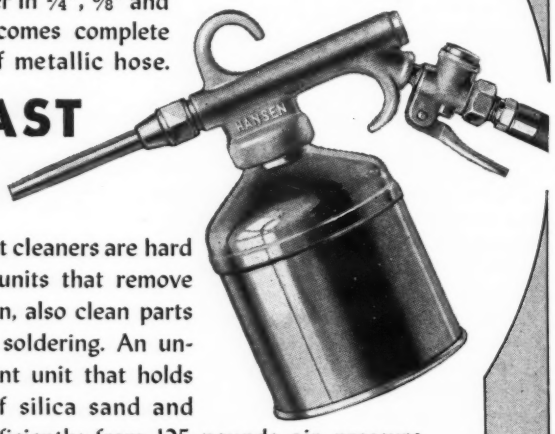
Clean up WITH HANSEN

ENGINE CLEANERS



Hansen engine cleaners are ideal for cleaning machinery or parts, spraying kerosene or other liquids on engines, machinery, etc. Flow of liquid is controlled by needle valve right at the operator's finger tips. Stem for connecting air line is furnished with each cleaner in ¼", ⅜" and ½" sizes, also comes complete with six feet of metallic hose.

SAND-BLAST CLEANERS



Hansen sand blast cleaners are hard hitting cleaning units that remove paint, rust, carbon, also clean parts for welding and soldering. An unusual and efficient unit that holds three pounds of silica sand and operates very efficiently from 125 pounds air pressure. Furnished with ¼" hose stem for air line connection.

Send for free catalog!

Hansen MFG. CO.

INDUSTRIAL Air Line EQUIPMENT

1786 EAST 27TH STREET . . . . CLEVELAND, OHIO

TESTING REARS

(*Continued from Page* 25)

"And you can do that, too," said Pop, "if you've got a grindin' attachment. We've got a valve grinder so we don't need an attachment for the lathe."

"But we will be gettin' some of that other work to do, won't we?"

"You sound kind of anxious. I thought you wasn't goin' to like lathe work?"

"I changed my mind," said Horace. "Now that I can do a piece of work without ruinin' it. It's a whole lot better than creepin' under cars all day."

"Yea," said Pop. "Nice, easy work for an old codger."

"Why, you old — " began Horace. But Pop was already on his way to the office and out of earshot.

The Big 3 Today!

Repairmen and car dealers are doing a big job these days, keeping America's cars, trucks and tractors rolling. Their best friend is the McQuay-Norris jobber. He supplies them with Altinized Engineered Set Piston Rings and other precision parts* backed by 33 years' experience. Then there's McQuay-Norris Engineering Service — practical guides and helps that take all guesswork out of every job. For real cooperation, call or visit your McQuay-Norris jobber first!

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*PISTON RINGS • PISTONS • PINS • VALVES
BEARINGS • SLEEVES • PUMP PARTS
BOLTS • BUSHINGS • SILENT-U SHACKLES
WHEEL SUSPENSION PARTS

DETROIT LETTER

(*Continued from Page* 39)

an internal-combustion engine such as used in airplanes or automobiles is directly proportional to the amount of air that can be pushed into the cylinders. It takes about 14 lb. of air, mixed with 1 lb. of gasoline, to obtain so-called complete combustion. A conventional gasoline engine, such as in automobiles, depends upon atmospheric pressure to push air into the engine. At the end of the exhaust stroke, when all valves are closed and the piston moved downward, a vacuum is created, which causes air to be pushed into the cylinder by the higher outside atmospheric pressure when the intake valves are opened. But, as a plane climbs upward, the air pressure decreases and the pressure available to push the air into the engine decreases. The weight of air in a given volume likewise decreases as the atmospheric pressure declines. Thus, if a given weight of air occupies 100 cubic in. at sea level, it will occupy 135 cubic in. at 10,000 ft., 268 cubic in. at 30,000 ft. and 408 cubic in. at 40,000 ft.

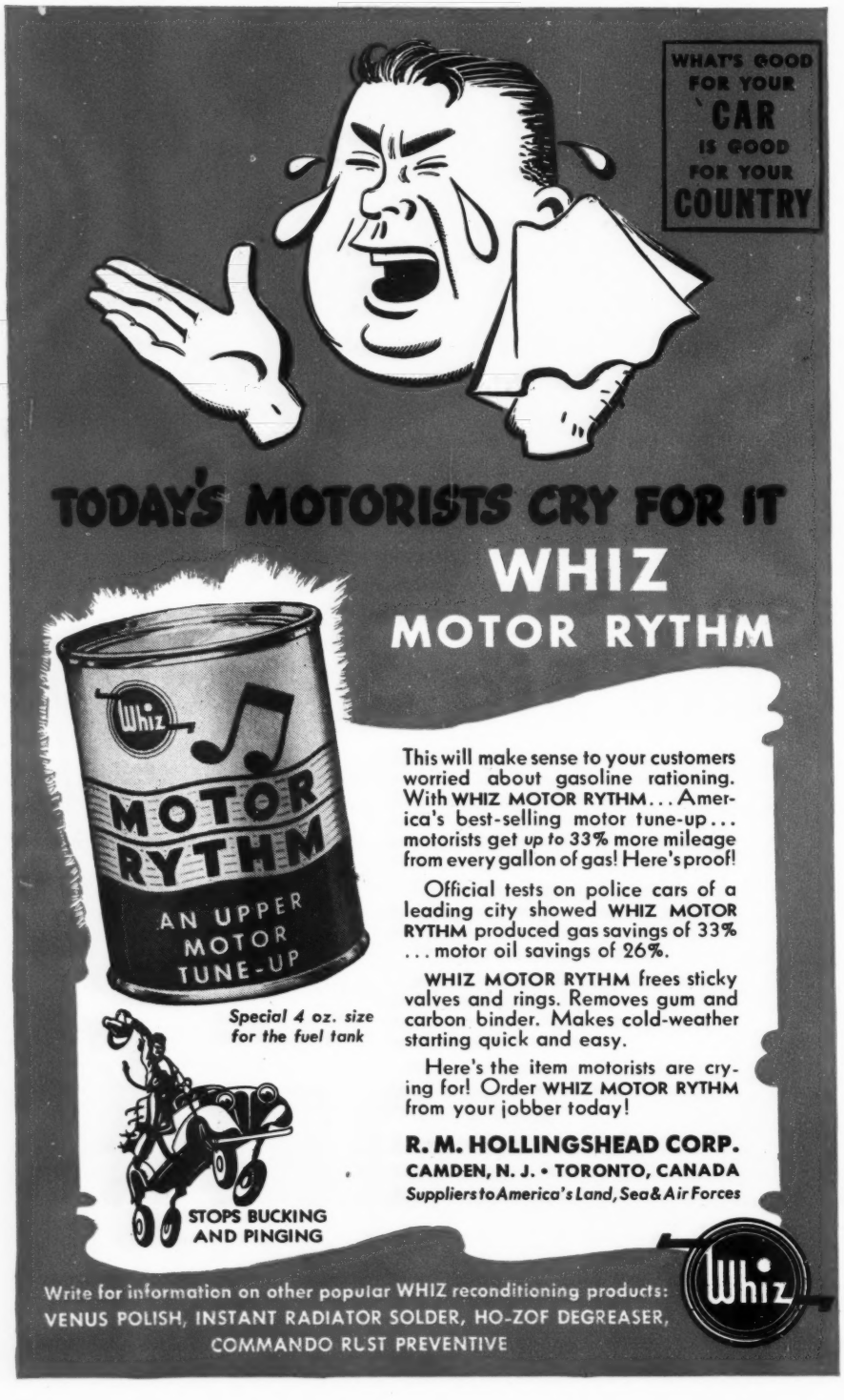
"Certainly I'm patriotic, Mr. Tegan, but I still don't see how parking the bike conserves gas!"

The effect of this thinner air density is evident in the power output of an aircraft engine built for sea-level operations when it climbs to higher altitudes. An aircraft engine that delivers 1,000 hp. at sea-level will drop to 702 hp. at 10,000 ft., 470 hp. at 20,000 ft., 295 hp. at 30,000 ft., and 140 hp. at 40,000 ft. At 40,000 ft., the density of the air is only 24½ per cent of what it is at sea-level. To get the same weight of air into the cylinders at higher altitudes, a supercharger is employed, this being simply a centrifugal-fan type of air pump running at very high speed. The supercharger must take enough air at the lower density of the higher altitude and force it into the engine at the same rate as the engine receives air at sea-level. Thus at 30,000 ft. about three times the volume of air must be delivered to the engine cylinders as at sea-level.

Engineers of the Allison Division of General Motors have prepared an informative paper outlining eight general methods of supercharging. The power to drive the supercharger may be derived from the engine, which takes away some power that might be used to drive the propeller, or it may be derived from the exhaust blast from the engine, which is used to drive the second-stage supercharger in the turbo-supercharger installation.

Inasmuch as all high-horsepower aircraft engines have superchargers, the supercharger on a sea-level engine has sufficient capacity only to provide the air required to attain the horsepower rating which has been determined for the engine at sea-level. A single-speed, single-stage supercharger is the lightest and most

(*Continued on Page* 52)


WHAT'S GOOD FOR YOUR CAR IS GOOD FOR YOUR COUNTRY
TODAY'S MOTORISTS CRY FOR IT
WHIZ
MOTOR RYTHM
Whiz
MOTOR RYTHM
AN UPPER MOTOR TUNE-UP
Special 4 oz. size for the fuel tank
STOPS BUCKING AND PINGING
This will make sense to your customers worried about gasoline rationing. With WHIZ MOTOR RYTHM... America's best-selling motor tune-up... motorists get up to 33% more mileage from every gallon of gas! Here's proof!
Official tests on police cars of a leading city showed WHIZ MOTOR RYTHM produced gas savings of 33% ... motor oil savings of 26%.
WHIZ MOTOR RYTHM frees sticky valves and rings. Removes gum and carbon binder. Makes cold-weather starting quick and easy.
Here's the item motorists are crying for! Order WHIZ MOTOR RYTHM from your jobber today!
R. M. HOLLINGSHEAD CORP.
CAMDEN, N. J. • TORONTO, CANADA
Suppliers to America's Land, Sea & Air Forces
Whiz
Write for information on other popular WHIZ reconditioning products:
VENUS POLISH, INSTANT RADIATOR SOLDER, HO-ZOF DEGREASER,
COMMANDO RUST PREVENTIVE

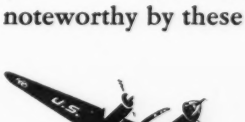
To Save Gasoline keep Spark Plugs Clean

Every dealer who stocks and sells Champion Spark Plugs will be gratified to learn of their outstanding records with our armed forces.

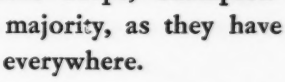
Champions are on active duty on every front.

Champion Aircraft Spark Plugs are serving with distinction in the air forces of the U.S. Army and Navy in planes of every type and size.

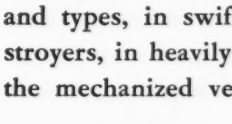
Their top-flight performance, extreme dependability and unusually long life have been deemed especially noteworthy by these branches of the service.



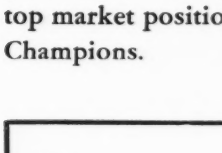
In the wide variety of gas-engine-powered boats being used by the Army, Coast Guard, Navy and Marine Corps, Champion-equipped engines are in the majority, as they have long been in marine engines everywhere.



In jeeps, trucks of all sizes and types, in swift tank destroyers, in heavily armored and armed tanks, and all the mechanized vehicles which make ours the finest fighting force in the world, Champion Spark Plugs are synonymous with better performance and dependability.



Thus Champions are now demonstrating by the two qualities that have always distinguished them—better performance and dependability—their primary right to top market position. It pays you well to stock and sell Champions.



The salvaged metal from worn-out plugs
Will help to make more tanks;
And they'll be used to shoot more slugs
Into those Axis cranks.

CHAMPION SPARK PLUGS

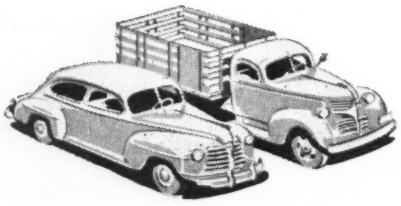
THROW YOUR SCRAP METAL INTO THE SCRAP

THE FACTORIES SERVE with War Materials Production

PLYMOUTH · DODGE
FOR VICTORY
DE SOTO · CHRYSLER

THE DEALERS SERVE with Car and Truck Maintenance

Your car was built to GO!



YOUR car or truck is the result of 40 years of continuous engineering development. It was built to be driven hard and often.

Under today's curtailed driving, *"still" wear* (caused by idleness or short runs) is apt to rob batteries of their power—tires of their maximum life—oils of their lubricating qualities.

Available to you are Plymouth, Dodge, De Soto and Chrysler dealers' service facilities and "know-how"—so important to the protection of your car or truck under today's driving conditions.

For factory-engineered and inspected parts and accessories, see a nearby Plymouth, Dodge, De Soto or Chrysler dealer. For Dodge Truck parts, see a nearby Dodge dealer.

PLYMOUTH DODGE
DE SOTO CHRYSLER
DODGE *Job-Rated* TRUCKS
DIVISIONS OF CHRYSLER CORPORATION

BUY U. S. WAR BONDS AND STAMPS

DETROIT LETTER

(*Continued from Page* 50)

compact form of supercharger and can be used in light airplanes up to critical altitudes of 20,000 ft. The critical altitude of an engine is the altitude at which the maximum power output of the engne begins to fall off directly with altitude. The speed of the single-speed, single-stage supercharger is increased over that in the sea-level engine to deliver the same weight of air to the cylinders at higher altitude. This in turn diverts more power from the propeller, so up to about 7,500 ft. a 1,000 hp. sea-level engine delivers more hp. However, above that altitude a 1,000 hp. engine with a single-speed, single-stage supercharger will deliver more power as the sea-level engine falls off in performance.

A two-speed, single-stage supercharger with a mechanical clutch is heavier and more complicated than the two previous types but it has certain advantages. The speed of the supercharger can be changed manually by the pilot when he deems it advisable, or it may be changed automatically by aneroid control when a certain altitude is reached. This type permits the supercharger to operate at lower speeds at low altitudes, thus taking less power from the propeller and making for better performance at takeoff and lower levels than in the single-speed, single-stage type.

A variable-speed, single-stage supercharger with a hydraulic clutch is economical in horsepower consumption between sea-level and the critical altitude because the clutch decreases the speed of the supercharger as the air density increases. There is some waste of power in the slipping of the hydraulic clutch and additional oil cooling must be provided in this type supercharger.

A two-stage supercharger with a mechanical clutch consists of two separate superchargers. The first stage is built in as part of the engine and always in operation. The second stage, connected by airflow lines, can be put into operation by engaging the clutch when the pilot desires. A typical 1,000 hp. engine equipped with this supercharger has a critical altitude of about 23,000 ft., greater than the previous types described, before power output begins to fall off.

The two-stage supercharger with a hydraulic clutch has improved performance over the two-stage type with a mechanical clutch at lower altitudes, but it is heavier, bigger and more complicated.

The addition of intercooling to the two-stage supercharger with hydraulic clutch increases the critical altitude by about 6,000 ft. to 29,000 ft. for a typical 1,000 hp. engine. In intercooling, a heat exchanger is used for

(*Continued on Page* 56)

"CoMaX BRAKE LINING

not only saves us money, but keeps our equipment rolling instead of tying it up for repairs"... *writes Consolidated Forwarding Company*

CONSOLIDATED FORWARDING COMPANY
INCORPORATED
1558 WEST PIERCE STREET
Phone: Mitchell 5112
MILWAUKEE, WISCONSIN

TERMINALS
St. Louis, Mo.
Chicago, Ill.
Waukegan, Ill.
Racine, Wisc.
Kenosha, Wisc.
Milwaukee, Wisc.

I. M. SCHEIRE, President
I. B. SCHEIRE, Vice-President
W. J. RICHARDSON, Secretary

October 28, 1942

Wagner Electric Corporation
925 N Broadway
Milwaukee, Wisconsin

Gentlemen:

Several years ago we decided to try CoMax brake lining to find out for ourselves if it was the answer to our brake problems. It did not take us very long to learn that CoMax was the answer and we have used it exclusively ever since.

CoMax has eliminated brake squeals, drum scoring, frequent brake adjustments and brake relining (this not only saves us money but keeps our equipment rolling instead of tying it up for repairs).

Our trucks, tractors, and trailers are equipped with various types of brakes and power. CoMax improves the performance of them all. No more wet weather trouble either.

We do not hesitate to recommend CoMax brake lining to all fleet operators.

Yours very truly,
CONSOLIDATED FORWARDING COMPANY

Dale Tucker
Dale Tucker, Dispatcher

"IT'S THE ANSWER TO BRAKE PROBLEMS"

USERS are great boosters for CoMaX Brake Lining ...The letter reproduced above is a typical example of what those who speak from experience have to say about the high quality and superior features of CoMaX.

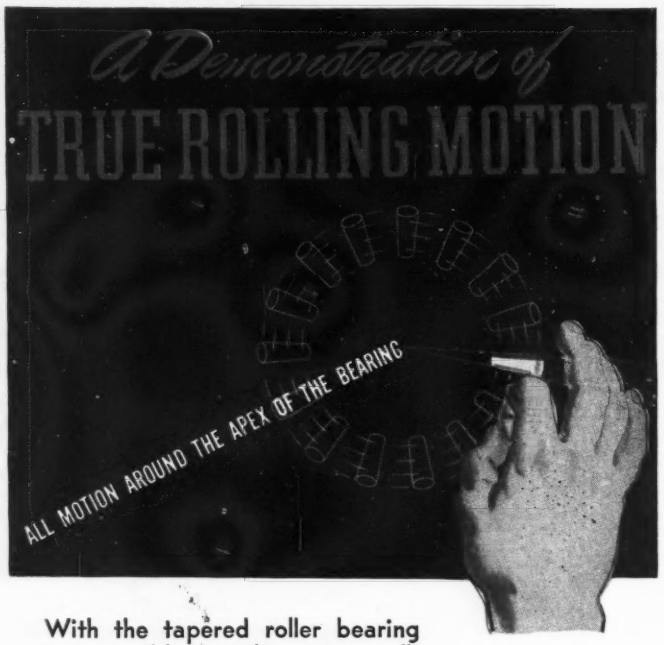
CoMax is the finest in molded brake lining. It is ideal for quick, safe, smooth stops. It is long-lived, has reinforced backing, is non-compressible, uniform in texture, easy on drums, ideal for quick stops, quiet and smooth in operation, and age-proof. In short, Wagner CoMaX is the answer to the demand for a dependable and high-quality brake lining. Available in rolls, sets, blocks and slabs.

Get in touch with nearest Wagner CoMaX jobber, or write us for catalog and prices covering complete line.

B43-1

AUTOMOTIVE PARTS DIVISION **Wagner Electric Corporation** SAINT LOUIS, MO. U. S. A.

HYDRAULIC BRAKE PARTS & FLUID . . . AIR BRAKES . . . BRAKE LINING . . . CLUTCH FACINGS



With the tapered roller bearing it is possible to achieve true rolling motion—whereby lines projected from all working surfaces meet at a common point on the axis of the bearing, called the apex.

But *tapered roller bearing* design is not necessarily synonymous with *true rolling motion*. For the achievement of true rolling motion is also dependent upon tapers being on apex for cone, rollers and cup of any particular bearing. Precision manufacture is another pre-requisite. So, too, is a positive method for separating rollers to prevent the generation of friction by roll-to-roll contact.

Combined in the Timken Tapered Roller Bearing are (1) correct design, (2) tapers on apex, (3) precision manufacture, (4) the multiple-perforated cage—which together result in true rolling motion with greater operating efficiency and longer bearing life. There is no secret to the tremendous preference for Timken Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Service-sales Division

Timken Bearings are demonstrating their superiority to millions of American soldiers, sailors and marines. When these men resume civilian life, the preference for Timken Bearings will be stronger than ever before.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF
"All There Is In Bearings" *TAPERED ROLLER BEARINGS*

HELP ASSURE VICTORY

Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel. Use the Telephone Only When Important. Salvage All Scrap and Waste Material.

WASHINGTON WHISPERS

(*Continued from Page* 35)

*FEMALE OF THE SPECIES

Some months ago an item appeared here saying that the Army was training and expected to use women mechanics. Following through on that item, it can be reported that the women are now at work. They are used primarily in base shops where a large personnel permits specialization. The girls, after training, are hard at work overhauling such units as fuel pumps and generators. As their work progresses, so does their training. Given sufficient time the girls will be all-round mechanics. That women can be satisfactory mechanics is borne out by Brig. Gen. Henry's public statement that an all-girl crew at an air base in Utah had the best record for speed and competency in installing and tuning overhauled engines in Army bombers.

Most die-hards will still not admit that women can do the job, despite evidence to the contrary. Neither will they admit that women can successfully drive commercial vehicles, even though women are being used by the hundreds on the Pacific Coast as bus drivers and at least one operator in New England is using women drivers on overland routes with 40,000 lb. units.

*CALL A CAB

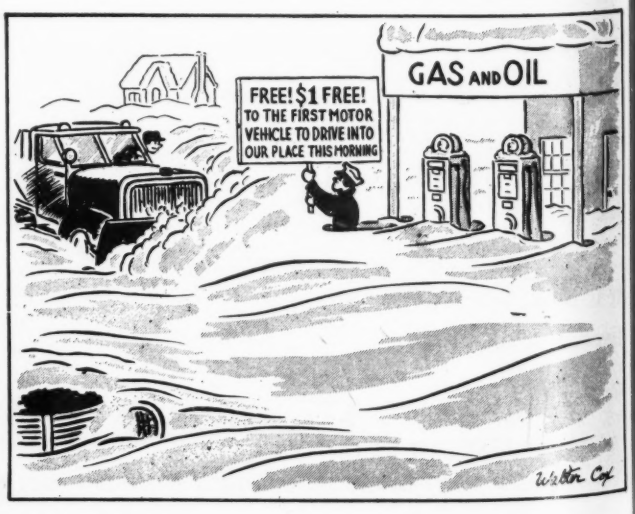
The recent ban on so-called pleasure driving has resulted in a boom in the taxicab business in metropolitan centers and adjoining suburbs. In many cases, a cab takes a passenger to some outlying place and then returns to its starting point. When the passenger then wishes to return, he calls for another cab which must go after him and then bring him back. This method of transportation amounts to twice the mileage that would be required by private car, which is a new way of conserving gasoline and tires. Inquiry reveals that no one has figured out the answer to that one yet or if they have they are not talking about it.

*CLAIMING AGENT

ODT has been made a claiming agent of the nation's stockpile of critical materials to make sure that highway transportation gets its share. This has caused some optimism in official quarters, but a check in Detroit revealed several manufacturers of automotive parts shaking their collective heads sadly and saying that the Controlled Materials Plan is already showing signs of bogging down just as badly as the Production Requirements Plan did.

*PARTS SALVAGE

The Army is really warming up to a real parts-salvage program. It has a staff of competent officers working on ways and means of making parts usable all over again without throwing them into the junk pile and hoping that they will come back as new parts. It looks as if the time will come when a motor transport officer will be judged not only by how well his trucks run but also by the size of his junk pile.



2 WAYS TO PREVENT BATTERY BLACKOUT

Recharge or Replacement

FOR REPLACEMENT, I RECOMMEND **GLOBE**... *THE BATTERY BUILT FOR WARTIME REPLACEMENT SERVICE...*

Says Joe Warner, Deluxe Motor Co.

With gas rationing, most of your customers are not driving enough miles to keep their car batteries charged . . . but they don't realize it. Neither do they know that cold weather starting, headlights and radio, low charging rate, corroded terminals and low water level hasten battery blackout.

Preventing Battery Blackout is an important and valuable wartime service to your customers. Regular inspection spots the power thieves, lengthens power life, tells you when recharge or replacement is necessary.

When replacement is necessary, give your customers the extra protection of GLOBE SPINNING POWER BATTERIES . . . powered for wartime replacement service.

GLOBE-UNION INC., Milwaukee, Wis.

GLOBE *Spinning Power* **BATTERIES**

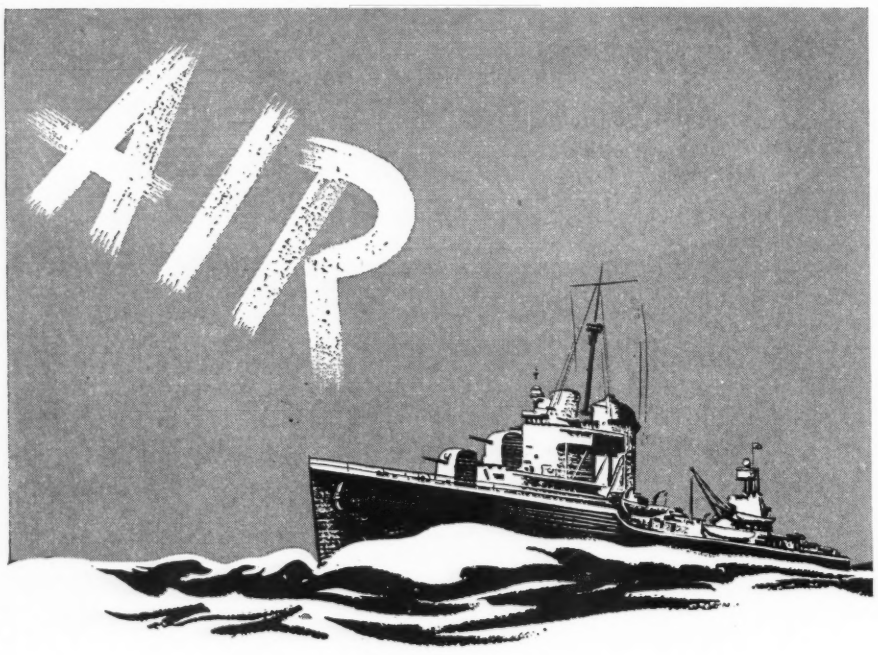
DETROIT LETTER

(*Continued from Page* 52)

cooling the air between the first and second stages of superchargers. This makes for introduction of fuel-air mixtures into the combustion chamber at lower temperatures, increasing engine efficiency and permitting use of maximum compression ratios. However, intercooling adds weight and increases drag with additional cooling surfaces.

The turbo supercharger with intercooling, used largely in bombers, was developed during World War I, the second supercharger is driven by the turbo from the exhaust blast of the engine and thus does not subtract any of the horsepower from the engine's crankshaft. It is regarded as the most economical of all methods of supercharging but it is somewhat bulky in size and weight and thus unsuited for fighter planes. This type preserves full horsepower to a higher altitude than any other method.

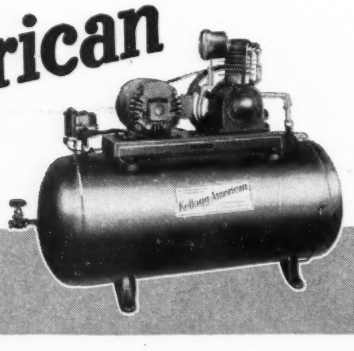
While more supercharging results in better high-altitude performance by the engine, it also results in increasing complication, weight and often drag for the plane. An airplane engine is fundamentally a package of horsepower in the plane designer's hands. He can use it to fly high or low, to carry more weight or to travel at greater speed. But, if he takes one, he cannot have a maximum of the other. Combat airplanes evolve from a series of compromises on the essentials which the designers want. Weight must be sacrificed for speed and vice versa. You cannot have your cake and eat it, too.



. . . NOT WIND!

When air gets worked up to the point of being called a strong wind, its usefulness is gone, and it becomes a menace. Air—cool, clean air—at controlled pressures —is a valuable tool in automotive service and industry. No hot air, but cold hard facts on increased efficiency, greater dependability, lower cost, has built the name and reputation of Kellogg-American. That's why this is preferred equipment in shops across the country, why so many are going today into war work and military material. *American Brake Shoe and Foundry Co., Kellogg Division, Rochester, New York.*

Kellogg-American
REG. U. S. PAT. OFF.



AIR COMPRESSORS • CAR WASHERS
CAR LIFTS • PAINT SPRAYING EQUIPMENT

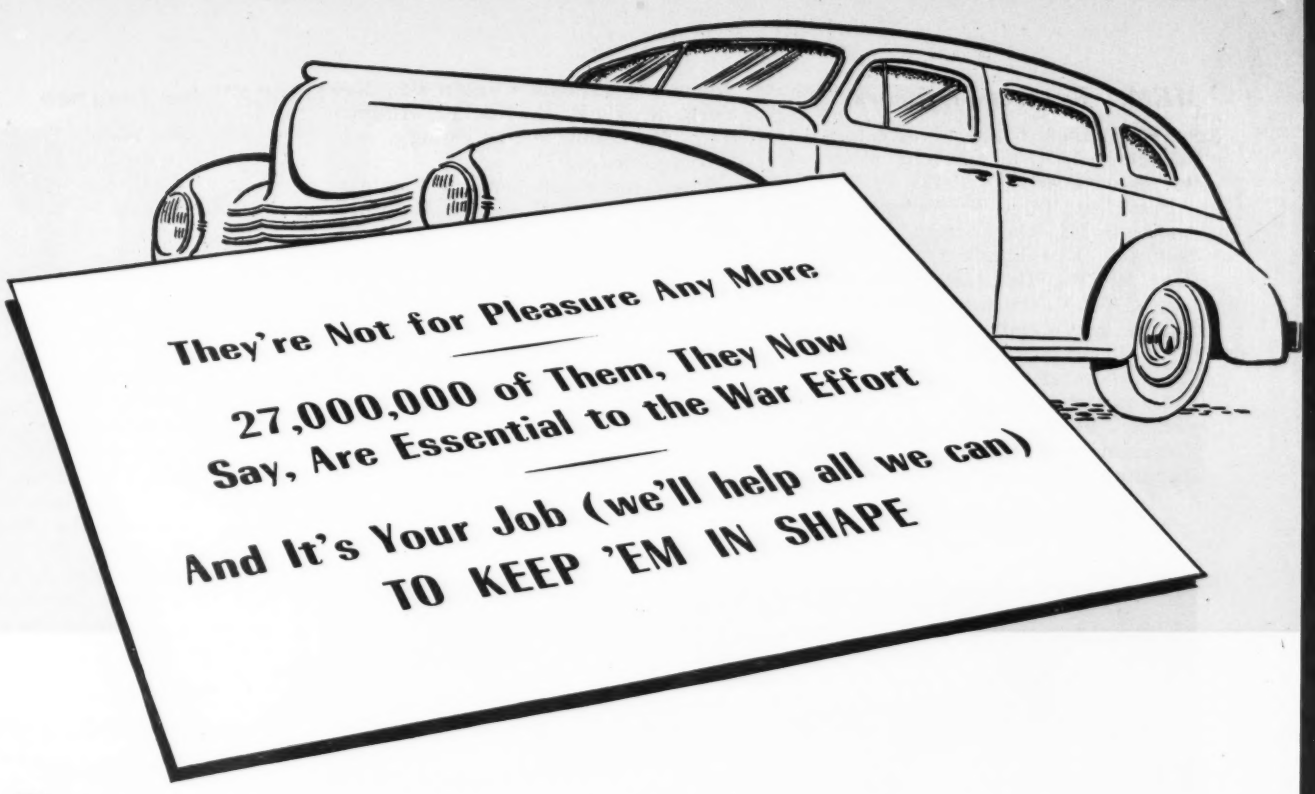
TRANSMISSION

(*Continued from Page* 23)

the rear bearing and thrust washer. Lift the countershaft and gear assembly out the top of the case. Tap the front countershaft bearing around the outer edge toward the front and remove the spacer and bearing. The low-speed gear is integral with the countershaft. The countershaft driven gear and the second and third speed gears can be pressed off the countershaft.

The transmission case cover may be disassembled by pressing down on the shift-lever ball cap and turning in a counterclockwise direction. This will allow the shift lever to be removed from the cover. The shift rods may be removed by taking out the lock bolt and retainer at the rear of the cover and the set screws in the shift forks and then driving the shift rods out of the cover. If the shifting-fork guide plate requires replacement, it will be necessary to cut the four rivets holding the plate to the assembly to remove it. It will be necessary to use new rivets when replacing this assembly.

Clean all parts carefully in a suitable cleaning solution and dry with air pressure. Carefully inspect all bearings for roughness or pits. If either condition is found to exist, replace the defective part. Examine all gear teeth for pitting or chipping. Any gears showing either condition should be replaced. Inspect the splines on the mainshaft and on the main drive gear for evidence of twisting. Renew the shafts if the splines have twisted. Place the sliding gears on the mainshaft and check the clearance along the splines. This clearance must not exceed .0065 in. Examine the countershaft gear thrust washer and check the thickness which should not be less than .123 in. Clearance between the shift forks and gears should not be greater than .019 in. The maximum clearance between the reverse idler gear bushing and shaft should not exceed .0045 in. The shift fork lock ball spring free length should be 1 1/32 in.


They're Not for Pleasure Any More
27,000,000 of Them, They Now Say, Are Essential to the War Effort
And It's Your Job (we'll help all we can) TO KEEP 'EM IN SHAPE

SHORT-HANDED though you may be—handicapped by the loss of good men to the armed services and to armed industries—it's a job that only you automotive men of America can do. And you'll get the job done. But you won't have time, or gas, or rubber to waste shopping around for parts and supplies. That's why we say...

YOUR N·A·P·A JOBBER IS A GOOD MAN TO KNOW!

NATIONAL AUTOMOTIVE PARTS ASSOCIATION • EXECUTIVE OFFICES: 705 FOX BUILDING, DETROIT

NAPA Assurance of Quality

THESE ARE THE PRODUCTS WHICH CARRY NAPA'S ASSURANCE OF QUALITY

AMERICAN BRAKEBLOK
Brake Lining, Clutch Facings, Fan Belts, Radiator Hose

ALLIED-A P C
Nukrome Valves, Valve Guides, Pin and Boss Bushings

ALLIED-PRECISION
Piston Pins

ALLIED-RAYMOND
Valve Springs and Keys

ALLIED-WISCONSIN
Pistons, Cylinder Sleeves

BALKAMP
Parts for Ford, Chevrolet and Plymouth. Tie-Rod Ends, Shackles, etc.

BELDEN
Spark Plug Wire and Sets, Primary Wire and Looms, Battery Cables, Cordlites and Soldering Irons

BROWN-LIPE
Transmissions and Clutches

BUFFALO
Mufflers and Tail Pipes

CELORON—Timing Gears

DETROIT—Universal Joints

DITTMER
Transmission Gears, Shafts, and small parts

DOUBLE DIAMOND
Drive and Pinion Gears, Flywheel Gears, Axle Shafts, Differential Parts

DUCKWORTH
Timing Chains

ECHLIN
Ignition Parts, Coils, Testing Instruments, Electrical Bushings

FEDERAL—Ball Bearings

GRAPHO—Water Pumps and Parts, Packing

MARTIN-SENOUR
Spraying Lacquers, Synthetic Enamels, Painter Specialties, Thinners, Reducers

MONMOUTH
Clutch Plates and Parts, Engine Bearings, King Bolt Sets

NEW BRITAIN
Automotive Hand Tools

PURITAN
Hydraulic Brake Fluid, Shock and Knee-Action Oil Gasket Seals

RARITAN—Roller Bearings

SPICER—Universal Joints

STANDARD
Oil Seals and Grease Retainers, Gear Adjustment Shims

TRICO
Windshield Wipers, Fans, Washers, and other Vacuum-Operated Safety Products

UNITED
Hydraulic Brake Parts, Brake Cables, Fuel Pump Parts, Speedometer Cables and Parts

—and other parts and materials

A NATION-WIDE ORGANIZATION OF INDEPENDENT WAREHOUSING DISTRIBUTORS

MEMA Reelects Officers

The MEMA board of directors at its Jan. 14, 1943 meeting reelected its 1942 officers for 1943:

President, John W. Anderson, The Anderson Co., Gary, Ind.; vice president, C. E. Hamilton, Automotive Gear Works, Richmond, Ind.; secretary, G. W. Thompson, Noblitt-Sparks Industries, Columbus, Ind.; treasurer, C. P. Brewster, K-D Manufacturing Co., Lancaster, Pa.

Also reelected for 1943 are the members of the executive committee: President Anderson, Vice President Hamilton, Treasurer Brewster, J. M. Spangler, National Carbon Co., New York, N. Y., F. G. Wacker, Automotive Maintenance Machinery Co., North Chicago, Ill.

The finance committee: President Anderson, Vice President Hamilton, and J. M. Spangler.

Named Ad Aide

Charles J. Durban has been appointed assistant director of advertising for the United States Rubber Co. He had been advertising manager for the tire division since July, 1940. In his new capacity he will continue to supervise all tire advertising.

"E" for Lempco

James F. Strnad

For exceeding their quota in producing ordnance materials, Lempco Products, Inc. Maple Heights, Ohio, have been awarded the Army-Navy "E" for excellence. The presentation of the burgee was made to James F. Strnad, president of Lempco, by Brig. Gen. Haig Shekerjian. The individual emblems were presented by Capt. Ross P. Schlabach, U. S. N., to William G. McAleer and John J. Klecan, Lempco's two oldest employees, who accepted on behalf of the other Lempco workers.

Women to Be Trained for Lubrication Jobs

A national program for the training of women to perform a dual war service by learning a specialized automotive profession was proposed last month by Chevrolet, according to William E. Holler, general sales manager. Through a series of service schools throughout the country, young women are to be trained as lubrication experts, thus freeing men for two important wartime jobs—on the fighting front or as mechanics on the vital transportation home front.

Already, one school has been held under Chevrolet auspices, 23 young women being trained as lube-rack attendants. Without exception, they have been endorsed by the dealers employing them as capable operators fully qualified to take over this highly specialized operation.

In a four-day school, conducted by the Oakland, Cal., Bone service personnel, 23 girls of the 84 applicants for the service training were taught a full course in lubrication. Technical terms were simplified, basic procedures carefully mapped, and tools and equipment fully explained. Examinations given at the close of the course revealed that all girls had passed with creditable grades, and 16 had scored about 90 per cent.

Philadelphia Dealers Name Bury President

M. H. Bury, De Soto-Plymouth dealer, was returned to office as president of the Philadelphia Automobile Trades Association at last month's annual meeting of the group. Bury had succeeded J. E. Henry, of Willkie Buick, who resigned as president before completing his term.

Ed Bauer, of Davis Buick, was elected vice president of the association, succeeding E. J. Powell.

IMPERIAL Plastic* FITTINGS

FOR USE WITH COPPER, STEEL AND PLASTIC TUBING

—a replacement for brass fittings

IMPERIAL plastic fittings and plastic tubing make it possible for service men to handle almost any tubing connection problem that may be encountered in automotive maintenance work.

These fittings are available for prompt deliveries and, at the present time, no priorities are required.

Bulletin No. 331 gives complete information and prices.

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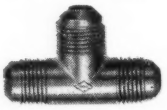

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BRAKE SERVICE

(*Continued from Page* 22)

rough edges from the port by means of the special burring tool.

After the cylinder has been washed in clean alcohol, the new valves and cups can be dipped in clean brake fluid and installed in the cylinder. Reassembly is done in the reverse order to the dismantling procedure.

While these instructions apply particularly to the combination-type master cylinder, the procedure to be followed on the box-type and the barrel-type units is similar. After the master cylinder has been overhauled as outlined, it is replaced in the car.

With the master cylinder installed in the car, it is necessary to check the adjustment of the brake pedal, for, if this is not correct, the brake fluid will be unable to return from the lines, and brakes will drag after several applications as the by-pass port may be blocked. The master-cylinder piston must be against its stop and the pedal link rod should be adjusted for clearance where it seats in the master-cylinder piston. There should be ¼ in. to ½ in. free play in the pedal pad before the pressure stroke starts. Greater free play or lash of the brake pedal reduces the effective travel of the master cylinder piston, which in turn reduces the effectiveness of the brake. The adjustment is made by adjusting the length of the pedal rod. This can be done after loosening the lock nut and removing the cotter pin and then the clevis pin G. Then, with a wrench on the large hexagon surface of the piston push rod link, adjust the length of the pedal rod to obtain the desired clearance.

As the wheel cylinders do not have any valves, they are much simpler to service than the master cylinder. While there are three types of wheel cylinders, the service procedure is virtually identical for all. The main point to watch is that they are replaced on the brake backing plates in their original position. Otherwise the brake force may be seriously affected.

The three types of wheel cylinders are the straight-bore type using rubber boots, the straight-bore type using metal boots, and the step bore type having a large and small bore at opposite ends of the cylinder. Rubber boots are used on this latter type which is used mostly on Ford, Studebaker and Chrysler cars. On Studebaker and Ford cars, the larger diameter operates the forward shoe while on Chrysler cars the smaller diameter operates the forward shoes.

To remove a wheel cylinder, first disconnect the tubing or hose at the wheel cylinder inlet. Unhook the brake shoe return spring. Remove the two cap screws which hold the cylinder to the backing plate and the cylinder may then be removed for further disassembly.

The unit can then be dismantled by removing the boots from each end and withdrawing the pistons, cups, and springs. The bleeder screw should also be screwed out of the cylinder.

If piston cups are swollen and enlarged, they must be discarded and the entire system flushed to remove any traces of mineral oil which would cause such swelling. The wheel cylinders must be smooth and free from scores and grooves. In most instances, it is advisable to hone them and also check the diameter with a special plug-type gage. If too large, the cylinders should be discarded. Be sure to check the pistons for burrs or any roughness.

Before reassembling, wash all parts in alcohol and then dip in clean brake fluid. It is also advisable to check wheel-bearing grease retainers, for, if any grease is passing these retainers and getting on the wheel-cylinder rubber boots, they will become swollen and lose their effectiveness.

The next lesson in the fundamentals of brake maintenance for apprentice mechanics will appear in an early issue.

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REGULATORS

(*Continued from Page* 29)

used to correctly adjust a voltage unit, and both require a finely calibrated voltmeter. The rest of the equipment consists of either a variable or a fixed resistance. Some service men use a variable resistance because one is usually incorporated in regulator testing kits, but in many respects a fixed resistance gives the best results. Use one of ¾ ohms for 6 volt systems and one of 1½ ohms on 12 volt systems. Fig. 4 shows a fixed resistance in use. The battery wire is disconnected from the regulator, and the other terminal of the resistance is grounded to the generator body or car frame. The voltmeter is attached from the regulator "BAT" terminal to ground.

The reason for using a resistance as a load instead of the battery is simply because the resistance has a known value, whereas the battery may be well-charged, half-charged or well-discharged. With the generator charging through the resistance unit, the voltage shown on the voltmeter should be within the limits prescribed in the manufacturers specifications, which for a 6 volt system will usually be somewhere around 7½ to 7¾ volts. If the regulator is allowing the voltage to go below or above the proper value, the regulator must be adjusted until the value is correct.

Fig. 5 shows the connections for testing a voltage regulator when a variable resistance is used. In this case the resistance is in series with the battery line and the generator is charging into the battery. The variable resistance can be so adjusted that, even if the battery is in a near dead condition, the effect on the generator and regulator is the same as if the battery were well-charged. Either of these methods can be used to make certain that the generator will not continue to charge at a high rate after the battery voltage rises to the point that goes with a well-charged battery.

By going back to Fig. 2, it will be seen that the main adjustment of the regulator voltage and current units is done by bending the lower spring bracket up or down a slight amount. This adjustment is critical and the final setting should be rechecked by cycling the generator from idle speed to full speed several times. The left-hand spring as viewed in Fig. 2 is usually the weaker of the two and is the one which should be adjusted.

There is a very simple operation that can be performed on a car generating system, and one which will quickly prove whether the regulator is functioning correctly or not. That is, provided the battery is in a fairly well-charged condition. That is done by operating the car engine up to the speed that gives the greatest charge on the ammeter, and allowing this charge rate to continue until the regulator starts to taper off the charge. This indicates that the generator has brought the battery voltage up to around 7½ to nearly 8 volts, or to the point that the regulator will allow. Now stop the motor, and with the ignition off (or the coil high-tension lead removed) let the starting motor crank the engine for about 30 seconds.

Now start up the motor again and watch the ammeter. It is best to have a good test ammeter in the line, as the car ammeter in too many cases cannot be depended upon for accurate readings. Since the battery has been "run down" by the long cranking period and the battery voltage is lowered, the charging rate should now be high. The charge rate will continue to be high for as long as it takes the generator to replace the current used during the cranking operation. This may be five minutes or so. As soon as the battery is back to its former condition, you will see the ammeter hand start to crawl back to a lower charging rate. This indicates that the regulator is operating in accordance with the state of the battery voltage, and, if you have correctly set the regulator, the top voltage that the regulator will allow to pass into the charging circuit will be safe for all normal conditions.

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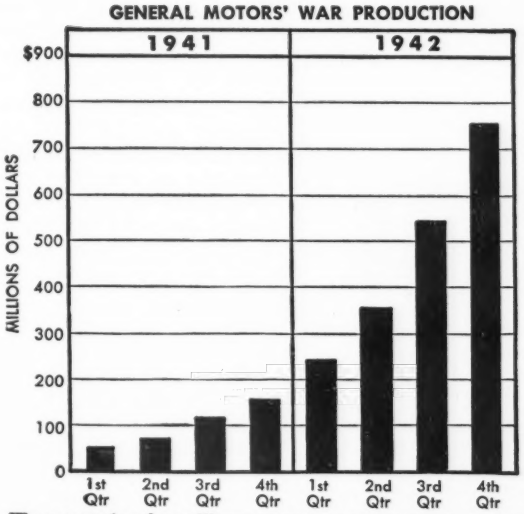
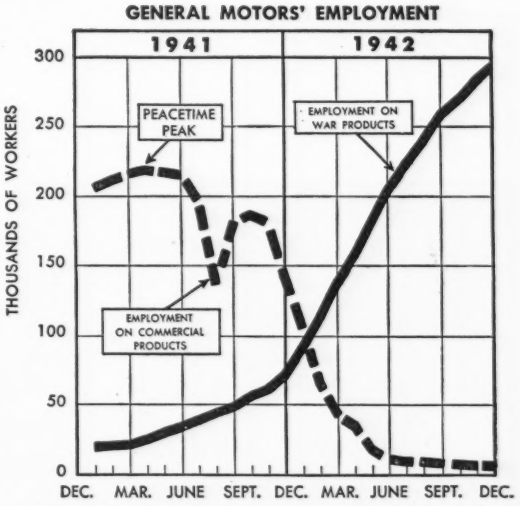
GENERAL MOTORS' WAR PRODUCTION



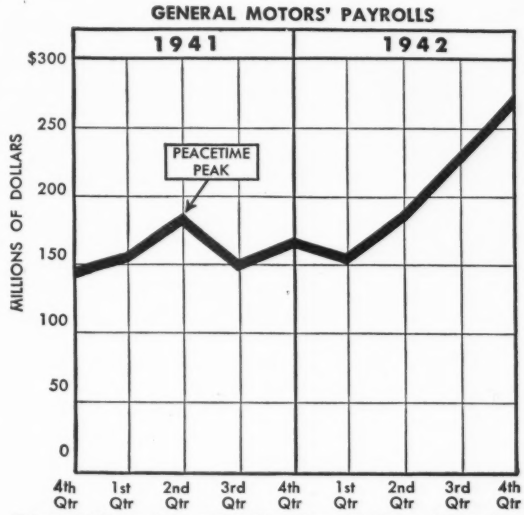
We regret that for military reasons we cannot report the number of guns, tanks, planes, shells, armored cars, trucks, Diesel engines for submarines and other uses, airplane instruments and hundreds of other items made and delivered by General Motors. We can say that in dollar value they totaled approximately $1,900,000,000—almost two billion dollars—in the year 1942 alone.

GENERAL MOTORS' EMPLOYMENT



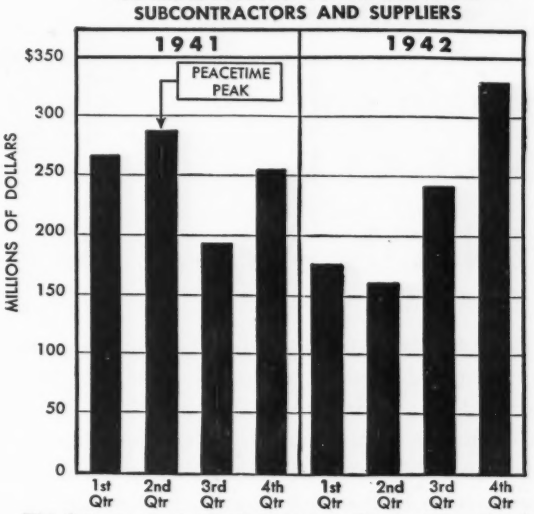
In June 1941, factory employment was 250,000—an all-time high. Since then, 50,000 replacements have been made, largely to replace men who have gone into the armed services, and 49,000 additional employes have been hired. To the 54,000 salaried workers employed in June 1941, 17,000 have been added. At the end of 1942 General Motors' employment reached 370,000—66,000 above the previous peak. It is anticipated that 100,000 will be added.

GENERAL MOTORS' PAYROLLS



General Motors' payrolls, like General Motors' employment figures, are at an all-time high in our 105 plants in 46 communities and 13 states—and five plants in Canada. The December 1942 payroll was $88,000,000. This was 45% more than the peacetime peak in June 1941. The total General Motors payroll for 1942 was $839,000,000—28% more than in 1941—the highest previous year.

GENERAL MOTORS' PURCHASES FROM SUBCONTRACTORS AND SUPPLIERS



The fastest, most effective way to distribute war work among the greatest number of producers is primarily through larger industrial organizations who have technical staffs available and who are accustomed to working with suppliers and subcontractors. Purchases from subcontractors and suppliers in the fourth quarter of 1942 were $330,000,000, compared with the peacetime peak of $288,000,000 in the second quarter of 1941.

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"THE AMERICAN WAY WILL WIN"

LEGALLY SPEAKING

A lawyer's interpretation of Federal and local court decisions of interest to repairmen, presented each month

By C. R. ROSENBERG, JR.

Fitness of Employee

The hiring of employees without proper training and experience may prove to be dangerous and expensive for the employing repairman. If because of his inexperience the employee injuries himself, the situation would be covered by workmen's compensation law in most states.

But suppose the incompetent employee, because of his incompetence, injures a customer or someone else! The consequences are certain to be painful for his employer. Assuming that the employee inflicted the injury in the course of his employment, the employer would be liable for the financial damages resulting from the injury; that would be true in any case.

If, however, it be shown that the employee was incompetent and the employer knew it, or by reasonable diligence should have known of it, the employer is also liable for "exemplary damages." The idea is to make an "example" of such a negligent employer by making him pay a financial penalty over and above the ordinary financial damages resulting from the injury. The amount of such "exemplary damages" is usually fixed by the jury trying the case. Sometimes such damages are called by the more appropriate name of "punitive damages."

Recently a New York court put it this way:

"When the employer has knowledge that the employee is unfit for the position and an injury thereby occurs by reason of such unfitness, *exemplary damages* are a proper element of an award." *(Nephew vs. State, 36 New York Supplement, second series, 541.)*

Payments on Different Debts

Where a repairman is obligated on two separate debts to the same creditor, it may be most urgent for him to pay one debt in full at the earliest possible date and not so urgent to pay the other. For example, it may be necessary to pay one debt in full in order to get clear title to a car or truck, while the other debt may simply be an ordinary obligation on open account. Consequently, when he makes partial payments, he should make sure that they are applied to the debt for which he intends them. He can do that by specifying at the time of payment the debt to which the payment is to be applied.

According to a recent decision of the Supreme Court of Arkansas, here's what will happen:

"Where two or more debts are kept separate and distinct from each other, the law will apply partial payments to the satisfaction first of the interest, then of the principal of the debt first falling due, and following that, first the interest, then the principal of each succeeding debt in order."

Briefly, the law contemplates that payments are applied to the oldest debt first, then the next oldest and so on down the line; and in each instance, the interest to date must be paid in full before anything is credited on account of principal. *(Brittian vs. McKim, 164 Southwestern Reporter, second series, 435.)*

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SLEEVE BEARING HEADQUARTERS
The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD
455 S. MILL STREET NEW CASTLE, PA.

Announces

A NEW, NATION-WIDE CONSERVATION SERVICE

TO MAKE this new service available quickly, AC has placed trained men in the field to carry to all service organizations the latest and best methods of diagnosing trouble, testing, adjusting, and repairing AC products with a minimum of parts replacement. This will help to conserve material and shorten the time required for repairs.

Because all AC products are important to the conservation of gas, oil, diesel fuel, and tires; and because some of them are so indispensable that their failure means that the vehicle is out of service; you will find this new AC service of great value to your shop.

So, AC urges you to take full advantage of its trained service personnel.

AC SPARK PLUGS · AC FUEL PUMPS · AC SPEEDOMETERS · AC OIL FILTERS · AC AIR CLEANERS
AC TEMPERATURE GAUGES · AC AMMETERS · AC OIL PRESSURE GAUGES · AC GASOLINE GAUGES

AC SPARK PLUG DIVISION — GENERAL MOTORS CORPORATION

WARTIME FUELS

(*Continued from Page* 31)

gasoline. This quantity of gas normally is carried in a bag 10 ft. long, 5 ft. wide and 5 ft. high, so it will be seen that the cruising range is limited. The usual practice is to fit a bag containing sufficient gas for a range of 20 miles.

The bags are filled with town gas at mains pressure through a 2-in. pipe provided with a non-return valve. Stand pipes are provided at convenient places, and no special apparatus is needed. It is the practice not to exceed 2 in. of water pressure (0.072 lb. per sq. in.) in a gas bag.

The gas is supplied to the engine through a pipe from the back of the bag. This supply pipe may be made of copper, light steel tubing, or rubber, but if the latter is used it should be of the armored type, to prevent kinking. The size of the pipe depends upon the engine power, but in no case should it be less than 1¼ in. right up to the carburetor. It is usual to fit a standard gas valve in the supply line, preferably near the engine, so that the gas can be completely closed off if desired. The supply line, in turn, is connected to the gas carburetor, of which several efficient types are on the market. The minimum requirements of a gas carburetor are:

1. To cut off the gas when the vehicle is stationary.
2. To give a constant mixture ratio through the full range of operation.
3. To give easy starting, freedom from stalling, and steady idling, with ready and immediate response to throttle variations.
4. To offer low resistance to gas flow, so that the maximum volume of explosive mixture can be drawn into the engine.

Several gas carburetors are now available in Britain, which are complete with gas throttle, are capable of adjustment to a wide range of mixture ratios, and can be fitted to engines of widely different design and horsepower. The most satisfactory method of fitting a gas carburetor is to provide a tee in the air intake of the gasoline carburetor. Alternative methods involve the use of a special casting which is inserted between the existing carburetor and the intake manifold, or drilling the manifold and fitting the gas carburetor to it. It is usual to connect the accelerator pedal to the gas throttle, but in some instances gas control is by hand through a cable from a lever fitted to the steering column.

Starting on town gas is easy, but acceleration is not so good as with gasoline. For instance, a light van with a 35-hp. engine was accelerated on gasoline from a standstill to 25 m.p.h. in 9.2 seconds, but it required 11.6 seconds when town gas was used.

The air-fuel ratio for optimum power on town gas is 4.1: 1 by volume; that is, 80 per cent of air and 20 per cent of gas enter the cylinder during each induction stroke. The calorific values of theoretically correct fuel-air mixtures are 95.0 B.t.u. per cubic foot, for gasoline and 85.2 B.t.u. per cubic foot for town gas. This difference of 10.3 per cent is a most important factor and is the main cause of the reduced power output on town gas. Experimental determinations of power on gasoline and town gas with unmodified engines show—as would be expected—that the loss of power on typical high-speed engines is greater than in the case of larger, slow-running engines.

In general, conversion to town gas results in a power loss of 15 to 20 per cent in the case of trucks with low-speed engines and 20 to 30 per cent in the case of private cars and light vans. Efforts have been made to increase the power on town gas by increasing the compression ratio, advancing the ignition very slightly, and removing the "hot spot." These alterations give considerable improvement, and it is possible to obtain up to 90 per cent of gasoline power.

Private cars, laundry vans, commercial trucks, and passenger buses

(*Continued on Page* 72)

THESE LITTLE THINGS ARE WINNING THIS WAR

American Shells, plenty of them, are thundering and screaming the American answer to the treachery of Pearl Harbor. American Trucks, many makes of them, are seeing to it that these shells get to the battle fronts all over the world, on time. American Tools, like the K-D Tools shown here, are keeping these trucks fit and fast, and hustling to feed the guns. *These little things are winning this war!* K-D Manufacturing Company, Lancaster, Penna., and Hamilton, Ontario.

K-D TOOLS

TOP, K-D 600 Valve Lifter, adjustable, tempered jaws.

CENTER, K-D 900 Hi-Offset Lifter, ideal for use under fenders. Auxiliary jaws shown ready for use.

RIGHT, K-D 115 Ignition Point Adjusting Tool, does the job right in the distributors.

K-D TOOLS are still available for repairing essential cars and trucks. See your Jobber or write the factory.

K-D TOOLS

The Hustlers for Your Toolbox!

Studebaker craftsmen again give "more than they promise"

The devastating bombing power and matchless fighting power of the Boeing Flying Fortress make comforting daily items in the war news. Much of the flying power for this invincible dreadnaught of the skies comes from Studebaker, long regarded as one of the world's foremost builders of motor car engines.

Studebaker, America's oldest manufacturer of highway transportation, is privileged to collaborate with Wright, America's oldest producer of airplane engines, in this vital assignment. And Studebaker is also building much other war matériel including tens of thousands of big, multiple-drive military trucks for the forces of the United Nations.

Today, as for generations past, Studebaker craftsmen make their watchword—*"give more than you promise."* Every Studebaker employee is justly proud of the achievements of his organization in the arming of our Nation and its Allies.

BUY U. S. WAR BONDS

War Trucks for the United Nations! Studebaker, famed for years for dependable transportation, has now become one of the largest producers of big, multiple-drive military trucks for the forces of the United Nations.

Studebaker BUILDS WRIGHT CYCLONE ENGINES FOR THE Flying Fortress

WARTIME FUELS

(*Continued from Page 70*)

are fitted with gas bags, and good results are obtained although the range is limited. Standpipes, however, are available at convenient places. In London alone at least 80 such pipes have been erected. A private car with an engine developing 48 hp. at 3800 r.p.m. usually is fitted with a bag containing 200 cubic feet of gas. This gas costs about 20 cents, is sufficient for about 20 miles, and can be charged into the bag in about 7 minutes. This system is excellent for vans used in local delivery work and, in such cases, not only solves the question of fuel supply but shows a saving on running costs.

A number of towns utilize as motor fuel the gas obtained from the treatment of sewage at sewage-disposal plants. Sewage gas contains about 70 per cent of methane, the rest being mainly carbon dioxide. It has a calorific value of approximately 700 B.t.u. per cubic foot. The cost of compressing, including labor and maintenance of plant, works out to about 7 cents for the equivalent of 1 gallon of gasoline.

"I've been drafted!"

Sewage gas is compressed into cylinders exactly as in the case of town gas. The equipment is identical with that used with coal gas, but, owing to the higher calorific value of the gas, a wider range can be covered, or a reduced number of cylinders employed.

One local authority in the London area has fitted a number of its vehicles with four gas cylinders, each of which holds 330 cu. ft. of gas at a working pressure of 3000 lb. per sq. in. The gas is reduced to 10 lb. pressure in the first-stage reducing valve, and to slightly under atmospheric in the second valve. An automatic mixer is fitted to the engine intake manifold, and driving is similar to running on gasoline. In order to obtain efficient performance, the compression ratio of the engine was raised to 8:1.

Liquefaction of sewage gas is under active consideration, and may prove the most desirable method of utilization.

The gases propane, butane and isobutane are available to a limited extent in Britain, as by-products of the hydrogenation of coal to oil. Excellent results are obtained with these gases as motor fuel, but they are used mainly for cooking and lighting in boats, houses, bungalows, etc., in out-of-the-way places.

Ad Backs Rationing

"We believe rationing in wartime is not regimentation—it is merely applying the Golden Rule clear across the board in a good cause." This is a quotation from the advertisement being published by the Borg-Warner Corp. to encourage willing acceptance of rationing as a means to victory.

"We believe," the ad declares, "if there isn't as much food or gasoline or clothes to permit everyone to have as much as he wants, the supplies that are available should be divided as equally as possible so that all may have a fair share."

ARROW

WILL CONTINUE TO DELIVER THE GOODS

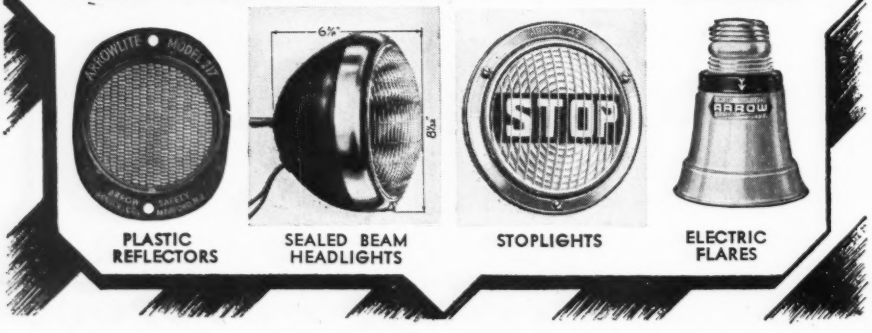
To keep you men supplied so you can keep vital transportation rolling here at home . . . and to continue to keep the armed forces supplied—that's ARROW'S job for the duration.

Important plans are now in the making for when the war is over. New products are taking shape on the drawing boards. Lessons learned in production will be put to good use and many other important changes will take place.

What does it all add up to? Just this—the ARROW line is going to take the lead in the field—TO MAKE REAL MONEY FOR YOU, TOO! For information address Dept. 168.

ARROW SAFETY DEVICE CO.
MEDFORD, N. J.

"ARROW IS GOING PLACES
—now and after the war"



PLASTIC REFLECTORS | SEALED BEAM HEADLIGHTS | STOPLIGHTS | ELECTRIC FLARES

INDEPENDENT

(*Continued from Page* 33)

as a fill-in. He has so far been able to produce the quantities of finished parts the prime contractor requires by utilizing the time between automotive jobs. When, as sometimes happens, there is a rush of repair work, he and his mechanic put in the necessary hours of overtime.

In the first three months, Collinson produced $700 worth of work. Aside from depreciation on the machines, power, a few hours' overtime for the mechanic, and a little emery cloth with which to polish the parts, there were no charges against this sum. That is an important sum when it is extra income. In fact, it is a temptation for Collinson when the prime contractor urges him to go all out on war work, even to acquire more lathes.

"But," says Collinson, "this war is going to be over some day and, when it is, I want to be in the repair business. It always has been a good business and it will be again. And the way to be in it is to stay in it."

GIRL MECHANICS

(*Continued from Page* 27)

as "apprentice mechanics," a title Nutter conferred on them, as distinguished from mechanics' helpers. As they attain skill, they will be graded up, with a corresponding increase in wages.

So far as physical fatigue is concerned, these women stand up as well as men. Their supervisors report that there is no slackening of pace late in the day. One reason may be the 15-minute rest periods morning and afternoon and a full hour for lunch. According to Ference, less productive time is lost through the regular rest periods than generally is the case with men who are working straight through with only a break for lunch.

The company has fixed up a lunch room for the feminine employees' exclusive use and most of them eat their lunch in the building. Toilet and rest room facilities have been made adequate with a very small expenditure.

Mac Short Is Elected 1943 SAE President

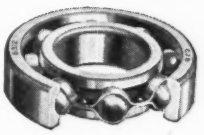
Mac Short, of Burbank, Cal., whose vocation is aeronautical engineering and whose avocation is designing and flying planes, was introduced as the 38th president of the Society of Automotive Engineers at the annual business session held at New York City Jan. 12 in connection with the SAE War Engineering Production Meeting. Short took office at the close of the annual meeting Jan. 15. As president he succeeds A. W. Herrington, of Marmon-Herrington Co., Indianapolis, Ind.

Short became an SAE member in 1925. In 1934 and again in 1941 he served as national vice president for aircraft engineering, and in 1940-41 was chairman of the Southern California SAE Section.

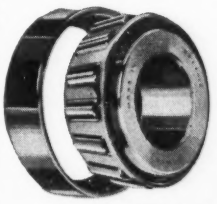
David Beecroft, of Bendix Aviation Corp., New York, was re-elected treasurer.

The new engineering vice-presidents elected to serve in 1943 are: Aircraft, John G. Lee, United Aircraft Corp.; Aircraft-Engine, S. K. Hoffman, The Aviation Corp.; Diesel-Engine, Grover C. Wilson, Universal Oil Products Co.; Fuels and Lubricants, W. M. Holaday, Socony-Vacuum Oil Co.; Passenger Car, R. E. Cole, Studebaker Corp.; Passenger - Car Body, G. J. Monfort, Chrysler Corp.; Production, Arnold Lenz, Chevrolet Motor Division, General Motors Corp.; Tractor and Farm Machinery, C. G. Krieger, Ethyl Gasoline Corp.; Transportation and Maintenance, Austin M. Wolf, and Truck and Bus, E. W. Allen, Yellow Truck & Coach Mfg. Co.

THE SERVICE MAN



and us..



YOU'D LIKE to get new bearings for replacement, and we, of course, are anxious to keep you supplied.

The new addition to our factory just completed should help toward this end. The maximum output in 1943 will be four times normal production and while it is true that most of this will be used for the direct war effort, we do hope to have sufficient surplus available for necessary replacements.

Do not throw away worn ball bearings.

The alloy steel in the races is valuable and when reground and fitted with new oversized balls and new retainers will give new bearing service. Use Ahlberg Ground Bearings for making replacements. Any Ahlberg representative, dealer or distributor can give you full details about reprocessing worn bearings. He can also give you valuable advice on the proper methods and equipment for making present bearings give longer service.

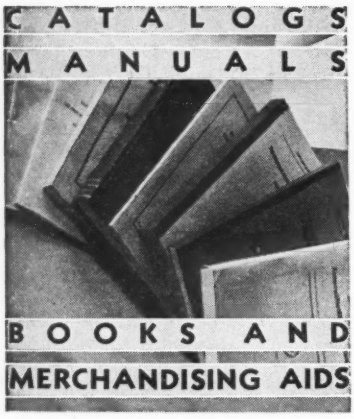
Factory Branches in all Principal Cities

CJB AHLBERG

AHLBERG BEARING COMPANY

Manufacturers of CJB Master Ball Bearings

3028 WEST 47th STREET • CHICAGO, ILL.



The U. S. Rubber Co., has issued a timely and valuable handbook describing the five commercial types of synthetic rubber now in use in the U. S.—Buna S, Buna N, Neoprene, Butyl, and Thiokol. A bird's-eye view of the comparative properties of these materials, compared with natural rubber, is given in a comprehensive table which relates their essential engineering properties.

The booklet covers the history of synthetic rubber, describes each of the five types mentioned above, and outlines some of the special scientific considerations involved in a discussion of synthetic materials. These notes on thermoplasticity, substitution, definitions of molecules, hydrocarbon, etc., should be of great interest to the practicing engineers.

* * *

"New Data on Oilseals and Greaseals" is the title of a bulletin published by the Gits Brothers Manufacturing Co., 1846 South Kilbourn Ave., Chicago, Ill.

This new bulletin presents the latest detailed information, recommendations, applications, diagrams, listings, prices, etc., on the broad line of Gits Oilseals and Greaseals, which are serving widely in aircraft, motorized units and in practically every branch of industry.

A cop of the new Gits Bulletin may be had, without obligation, by writing direct to the manufacturer.

* * *

Men or women responsible for maintenance of automotive vehicles who were not able to attend the recent War Transportation and Maintenance Meeting, sponsored jointly by the Office of Defense Transportation and the Society of Automotive Engineers, can obtain easily a complete copy of one of the important reports.

This is the report of Committee No. 5 on the subject "The Use of Expander-Type Piston Rings to Prevent Excessive Cylinder Reconditioning." It has been printed as a handy 12-page booklet and is being distributed free by Wilkening Manufacturing Co., Philadelphia, and by Pedrick piston ring jobbers, in the interests of more effective time and parts saving maintenance methods.

* * *

The Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich., has just issued a 24-page, two-color catalog on Detrex Solvent Degreasing Equipment. First-hand information is presented in an easily understood style on all phases of the rapid metal-cleaning method. The catalog contains numerous illustrations of various types of degreasers and data on solvents. Detrex degreasers of vapor, immersion, spray and vapor-spray-vapor types are featured. Adaptations of various kinds of conveyors installed in Detrex degreasers are described in detail. One portion of the book presents degreasers of special design and construction for cleaning in armament production, as well as Detrex processing and shot-testing equipment. Detrex alkali, emulsion, and spirits washers, and Triad alkali cleaning and stripping compounds also are covered.

Named Vice President

Harry M. Coleman, publicity director for MacFarland, Aveyard and Co. for the last four years, has been appointed vice president in charge of public relations, effective Jan. 1.

USE YOUR GAUGE

BEFORE

YOU ADD AIR

TO PREVENT 'FLATS'

Do you use a gauge just to find out whether your tires are carrying the recommended pressure? If so, you are overlooking an important use of the gauge . . . that is, to detect *excessive pressure loss* and thus help prevent flat tires.

FOUR STEPS HELP PREVENT FLATS

First, keep air-tight caps screwed down tight on all tire valves. Then you know the valves can't leak.

Second, check the exact amount of air pressure in each tire with an accurate gauge and record the pressure. (Use a separate record card* for each vehicle.)

Third, if necessary, re-inflate tires to recommended pressure.

Fourth, compare the recorded tire pressures of all tires on each vehicle. If one tire has apparently lost more air than its mates something is wrong; you may have a puncture. Have the tube checked immediately before underinflation damages the tire.

*As a tire specialist, you can help prevent careless waste of rubber that results from underinflation of passenger car and commercial tires. Write to Schrader for a supply of Pressure Record Cards.

TIRE PRESSURE RECORD

IMPORTANT: Tires showing pressure loss of three or more pounds below pressure of other tires, should be inspected to locate cause of pressure loss.

	STEERING	FRONT DUALS		REAR DUALS		SPARE TIRES	
CORRECT TIRE PRESSURE							

ARMY E NAVY

COMPARATIVE AIR LOSS TEST

THE Schrader SYSTEM OF FLAT TIRE PREVENTION

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* BROOKLYN, N.Y.

A Case of
LESS SCRAP, MORE FIGHT

THIS sleek and polished example of superfine machining is a propeller shaft for a Buick-built Pratt & Whitney aircraft engine.

It used to be cut by slow and painful whittling from a forging made from a 184-pound bar of steel.

By changing the forging method, Buick found a way to get the same results from a steel bar weighing only 165 pounds.

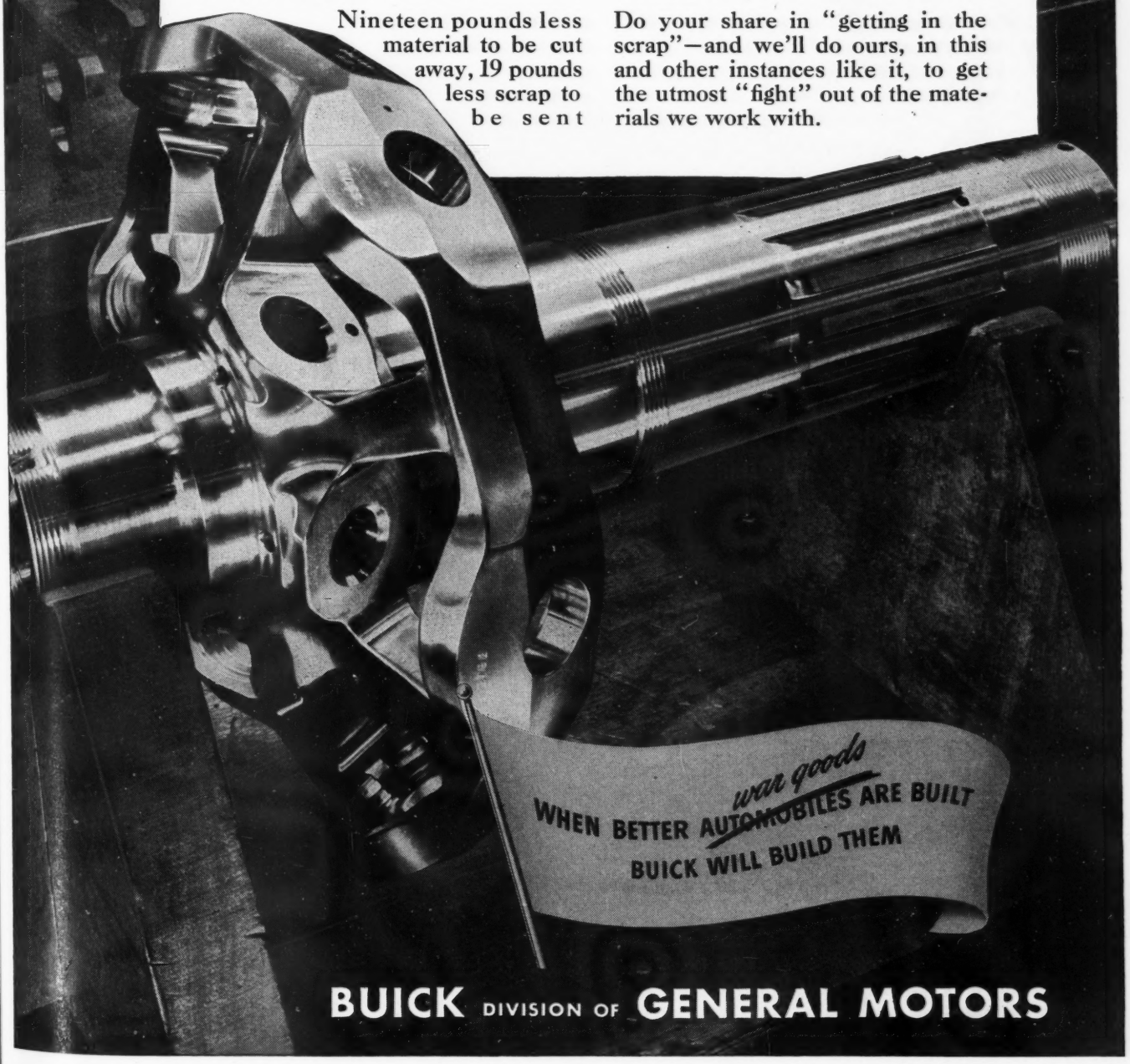
Nineteen pounds less material to be cut away, 19 pounds less scrap to be sent back for remelting, considerably less expenditure of precious machine tools and — *111 propeller shafts from the same material that used to deliver only 100—in less time per shaft!*

The country needs scrap metal—all you can dig up.

It also needs to *avoid* waste of materials in the making of fighting tools.

So we'll strike a bargain with you.

Do your share in "getting in the scrap"—and we'll do ours, in this and other instances like it, to get the utmost "fight" out of the materials we work with.



BUICK DIVISION OF GENERAL MOTORS

NEWS

(*Continued from Page 40*)

This certificate would bear a priority number, low if he bought it early, higher if he bought it later on. As soon as this priority was called, he would be permitted to buy a new automobile up to the value of $1,100.

It looks as easy as that, but there are a number of features that will appeal to neither the buyer nor seller.

In the first place, one of the chief advantages to the customer would be supplied by the manufacturer. This is the difference between the cash and merchandise value of the certificate. On a $1,000 certificate this difference would be $100 and $100 is more than most manufacturers' net profit per car in normal times.

Further, the value of a backlog of certificates to an individual manufacturer is questionable, since the buyer could apply the certificate to any make of car within the price range represented by the certificate. The dealer who sold the contract in the first place would receive the $10 down payment as his commission and that would be his whole compensation if the buyer chose to buy another make.

From the buyer's viewpoint, the plan has several disadvantages, most important of which is the fact that the purchaser is committing himself to no particular piece of merchandise but only to a certificate. If the upward trend of prices continues after the war, as seems likely, a certificate for $1,100 worth of automobile may fall far short of buying a car. The advantage of obtaining priority on the earliest cars built may turn out to be a disadvantage, since the first cars produced after the war certainly will not contain the improvements that are certain to come as soon as manufacturers can introduce them.

Of course, the purchaser may elect not to use his certificate to buy a car and may use it to buy a refrigerator, washing machine, or any of the other commodities covered by the plan, but in that case he would first have to redeem his certificate in cash. In that case, he would receive exactly the amount paid for it. That would make the certificate less desirable as an investment than war bonds, since the latter's value is increased by accumulating interest.

A possible minor objection from the buyer's standpoint is the penalties for failing to meet payments on time. A cash penalty would be charged for each day's delay, and serious delay might cost the buyer his low priority number.

Such advantages as the Nugent proposal seems to possess are on the side not of buyer or manufacturer but of the government. If widely accepted, the plan would give the Treasury considerable funds. Compulsory savings would achieve the same end. The plan's ability to check inflation remains to be demonstrated.

Although probably not contemplated by the Nugent plan, it might be possible for the government to exercise some control of post-war production. No certificate would be redeemable in merchandise until the Federal Reserve Bank had called certain priority numbers. Regulation of authorization to buy would automatically control sales and thus production.

"E" for Garco

The Army-Navy "E" burgee awarded for excellence of production, was presented recently to the General Asbestos & Rubber Division of Raybestos - Manhattan, Inc., North Charleston, S. C. This was the first Army-Navy "E" swallow-tail to fly over the Carolina low country and is said to be the first to be awarded to the asbestos textile industry.

Rear Admiral Cluverius presented the award to Executive Vice President Rohrbach, representing the workers. L. Mendel Rivers, Representative from South Carolina, acted as master of ceremonies. Col. Barnwell of the Army presented "E" pins to the employees, represented by Dan Legare, an employee for 39 years.

• There are no two ways about it—a horse has got to have oats to work and you as a service manager or station operator must handle product lines with profitable turnover today. Yet there are service operators still trying to struggle along handicapped by war restrictions which have practically eliminated the accessory and replacement parts phase of their business.

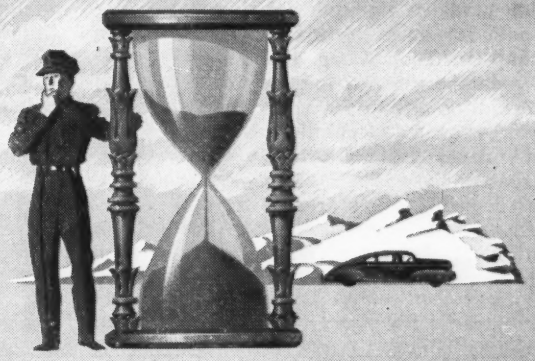
If your regular selling activity has been curbed, it will pay you to consider NOW the profit possibilities to be found in handling and servicing McAleer's Protective and Maintenance Material Line. Car, truck and bus owners everywhere are beginning to shake off that "what's the use" attitude and of their own accord many are already starting pre-Spring clean-up and refinishing programs, even though they don't know when they'll get another vehicle. They are beginning to realize it's the only way of preserving the finish and value of a vehicle through to victory. That "chin-up" attitude is the spirit to which you and every progressive service operator can contribute plenty NOW while it counts—and turn a pretty profit to boot!

The famous McAleer Protective and Maintenance Material Line is competitively priced for resale and attractively packaged for utmost selling appeal. Every item offers maximum dealer profit. All items are available in "for shop use" quantities and, when tied in with timely protective finishing maintenance operations, are proving to be money makers without equal for hundreds of service operators. McAleer Quality is assured not only by 18 years of practical manufacturing experience, but frequent laboratory inspection and field tests in comparison with competitive merchandise protect your selling investment.

You are a decisive factor in America's Car, Truck and Bus Conservation Drive —*Keep 'em Out of the Boneyard* and *Keep in Business too!* Again we say, you can make money with McAleer today. See or call your local McAleer Jobber, or write the Factory direct.

McAleer MANUFACTURING CO.
Quality-Controlled Finishing Materials
ROCHESTER, MICHIGAN

Nobody can Ration Your Time But You!



UNITED SERVICE MOTORS

A UNITED MOTORS LINE available everywhere through United Motors Service distributors

Nobody can ration your hours and minutes, but Inlite can help you save them for profitable productive work.

Original equipment quality Inlite goes on fast and eliminates costly time-stealing call backs for readjustments. Inlite comes into normal operation at once and gives the same efficient brake performance on the first braking as at 10,000 rationed miles.

And despite Inlite's large production for military needs, the chances are that your jobber can supply your requirements. So ask first for Inlite and conserve priceless time and manpower.

VICTORY WORK BY INLAND

The following products by Inland Laboratory Controlled Manufacture are enlisted for Victory: carbines; plastic helmet liners; tank tracks and clutches; Army truck clutches and brake linings; Army and Navy aircraft steering wheels; gun sights and shoulder rests; Marine engine motor mounts; parts for airplane motors, submarine chasers, torpedo boats, artillery lighters and landing craft.

INLITE

BRAKE LININGS • CLUTCH FACINGS

INLAND

Inland Manufacturing Division
General Motors Corporation

Campaign Seeks to Put Idle Hand Tools to Work

Based on the conviction that there are thousands of valuable hand tools lying idle for one reason or another, the Snap-On Tools Corp. has undertaken a campaign to bring these tools out of hiding and place them in the hands of working mechanics who are denied proper tools by the present war-created shortage.

The corporation has created a Tool Enlistment Division to handle the campaign. Mechanics who have extra tools to dispose of and those who need tools are asked to register with the division at 8028 28th Ave., Kenosha, Wis. The division will make a fair cash appraisal of the tools and arrange to put them back to work.

J. Fred Pilkerton

J. Fred Pilkerton, former president of Nashville Automobile Dealers Association, a member of the General Motor Dealers Council, and owner of the Nashville Motor Co., died Dec. 27. He was 47.

Pilkerton entered the automobile trade in 1923.

CHECK THE FEATURES YOU WANT IN A WORKBENCH...

you'll find them all in . . .

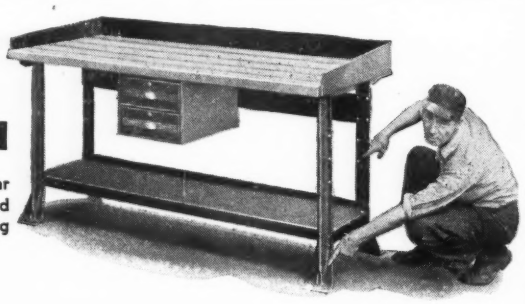
HALLOWELL SHOP EQUIPMENT

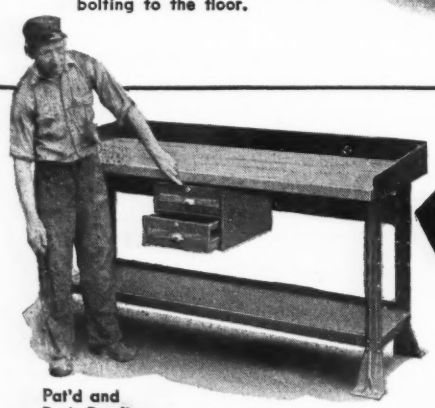
RIGHT SIZE

"Hallowell" ready-made Work-Benches are made in five heights and widths and in seven standard lengths from 3 to 10 feet. Any number can be joined end to end for a continuous work-bench. 1367 combinations available.

STURDY CONSTRUCTION

Constructed for long wear and made to stand firm and rigid without costly, time taking bolting to the floor.





CONVENIENCE

Pilfer-proof drawer units, shelves, cabinets, etc., are available to make the benches fit the job.

Prices and deliveries are right.

For full details get our Shop Equipment Catalog.

Pat'd and Pat's Pending Drawer is extra

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 561 BRANCHES: BOSTON · DETROIT · INDIANAPOLIS · CHICAGO · ST. LOUIS · SAN FRANCISCO

L. F. Skutt

Nash Appoints Skutt as Sales Manager

Announcement of the appointment of L. F. Skutt as general sales manager of the Nash Motors Division of Nash-Kelvinator Corp. is made by Frank R. Pierce, vice president in charge of sales.

Skutt, who joined Nash-Kelvinator in August, 1942, and who has been serving on Pierce's staff and as manager of the company's Chicago zone, was previously associated with General Motors for more than 20 years. His experience in the industry covers virtually all phases of the business, including management, sales, financial, merchandising, parts and service.

Starting out as a shop hand with Buick in 1919, Skutt progressed up through the G.M. organization to become head of the company's dealer accounting and management service.

Ring Division Wins "E"

Said to be the first piston-ring manufacturer to receive the honor, the American Hammered Piston Ring Division, Koppers Co., has been awarded the Army-Navy "E" flag. A determining factor in bringing the award to the division was its willingness to take care of 35,000 small orders for replacement rings for the Army and Navy while at the same time expanding tremendously its production for new equipment.

Heads Credit Group

D. E. Sturm, credit manager of R. M. Hollingshead Corp., Camden, N. J., has been elected to the Board of Governors of the Credit Department of the Motor and Equipment Manufacturers Association for a three-year term. Sturm also was elected to the executive committee for 1943.

THE SATURDAY EVENING POST
Actual photo of bullet leaving muzzle of Army rifle
When 1800 miles an hour is too slow
ADD A COUPLE of hundred miles an hour, if you expect this Army rifle projectile to pass inspection. It's easy to measure the speed of a bullet with a clever machine like the one at .....* *Arms Plant.
There, a Gould battery plays an important part in clocking the muzzle velocity of bullets. It "sees" their flight in exact feet per second.
You need only half an eye to see that Gould is the good choice for your car — just rely on the judgment of industry's leading engineers.
For greatest power and longest life, choose Gould Kathanode, the battery with spun glass construction first developed by Gould for American industry and American cars. Gould Storage Battery Corporation, Depew, New York — a division of the world's largest producers of replacement batteries.
*Censored.
DID YOU KNOW...
—THAT ON THE ROCKETS, ROCK ISLAND LINES' MODERN STREAMLINERS, AIR CONDITIONING AND CAR LIGHTING ARE POWERED BY GOULDS?
—THAT GOULDS STAND GUARD AGAINST POWER INTERRUPTION DUE TO LIGHTNING? UTILITIES USE GOULDS TO OPERATE EMERGENCY SWITCHES AND RELAYS AUTOMATICALLY.
—THAT GOULD MAKES BATTERIES FOR EVERY INDUSTRIAL USE? WRITE FOR DESCRIPTIVE LITERATURE.
For BATTERY CONSERVATION see your Gould Dealer
GOULD
THE BATTERY PICKED BY ENGINEERS
FACTORIES AT: NORTH BERGEN, N. J. • ATLANTA • CHICAGO • ST. PAUL • LEAVENWORTH • DALLAS • LOS ANGELES

KEEP FIRING!

That's Gould's motto for this war or any other. This Saturday Evening Post ad is just one shot in our continuing campaign to help Gould dealers sell batteries. Many more ads are running in '42 and '43, each one telling 3,500,000 Post readers that Gould is in business to stay and that Gould is the battery to buy . . . from *you*.

Herrington Elected

The Army Ordnance Association has paid tribute to one of the foremost exponents of American military preparedness by electing A. W. Herrington, chairman of the board of directors of the Marmon-Herrington Co., as a director of the national association.

Herrington is a past president of the Society of Automotive Engineers, a governor of the Society of American Military Engineers, a director of Aviation Corp., a director of the Gar Wood Co., a fellow of the American Geographical Society, and a member of other military and civil institutions. He was technical adviser to President Roosevelt's Economic Mission to India in 1942.

Office Shifted

The Detroit Rex Products Co., metal cleaning engineers, has moved its Los Angeles office to new and larger quarters at 1506 Santa Fe Ave. S. B. Crooks, transferred from the Mid Western Region with offices in Chicago, became manager of the Pacific Region Jan. 1, with headquarters at Los Angeles.

Hopkinson Is Named Willys Vice President

F. L. Hopkinson has been appointed vice president of Willys-Overland Motors, it has been announced by Joseph W. Frazer, president of the company.

F. L. Hopkinson

Hopkinson was previously associated for 17 years with General Motors Corp., serving both in its overseas and domestic divisions. Before joining General Motors, he was vice president of the Acme Motor Truck Co. of Cadillac, Mich.

New Products Planned

Five new products will be introduced to the automotive trade during 1943 by the Southern Friction Materials Co., Charlotte, N. C., it has been announced by John O. Camp, sales manager.

These products will be: 1, cotton-leather car mat protector; 2, blakstrap, a treated cotton webbing suggested for shims and anti-squeak application; 3, dry-processed molded brake lining; 4, external molded lining; and 5, transmission lining for Model T Ford transmissions. Cotton-leather is a newly developed material intended to replace certain leather and rubberized fabrics.

Made Vice President

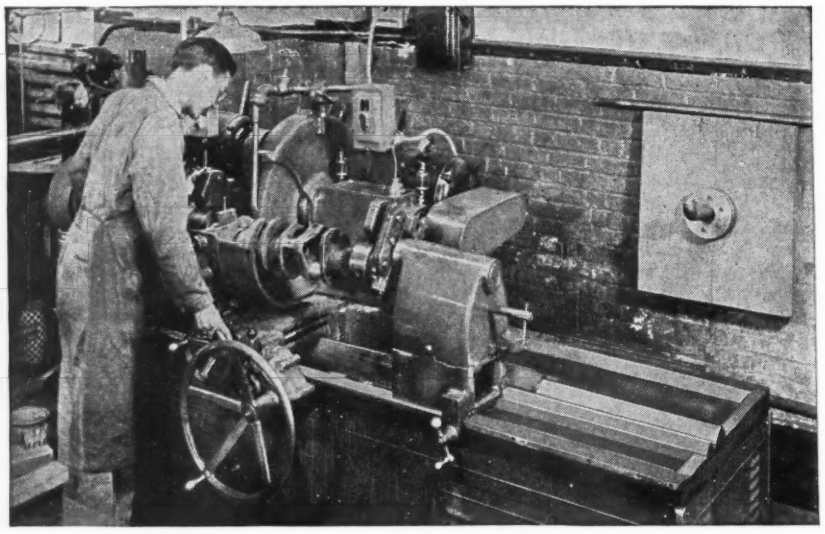
Raymond S. Livingstone, 35, has been elected vice president in charge of personnel of Thompson Products, Inc., Cleveland, Ohio. Fred C. Crawford, president, said the board's action recognizes Livingstone's record as personnel director since 1934 of the company and its subsidiaries.

The new vice president will continue in his capacity of directing employment, industrial training, labor relations, employee publications, and the social and athletic activities of over 16,000 war workers.

Gets New Account

W. Stewart Hollingshead, vice president in charge of sales, R. M. Hollingshead Corp., Camden, N. J., has announced appointment of the Aitkin-Kynett Co., Philadelphia, to handle the advertising of all the company's products. The appointment is effective Jan. 1, 1943.

Campaigns will be conducted for the following divisions of R. M. Hollingshead Corp.: "Whiz" Automotive Products, L. M. Olson, general sales manager; Household Division, N. T. Carson, sales manager; Industrial Division, W. F. Plowfield, sales manager; and Export Division, H. W. Lukens, manager.



CRANKSHAFT REGRINDERS ARE WORKING DAY AND NIGHT...

. . . there are no shortages in the crankshaft regrinding business, regardless of curtailed driving. Especially in the truck and bus field. Every crankshaft grinder in the country is swamped! It is the most profitable shop operation being done today! And it's increasing in volume fast, and will continue to increase for long after the war is ended.

ARMY E NAVY

Lempco proudly flies the "E" award for outstanding performance in war production.

LEMPCO PRODUCTS · INC.
BEDFORD · OHIO · U·S·A
ESTABLISHED 1919

SEE ONE WORK—MAIL COUPON

Lempco, Dept. MA Bedford, Ohio
GENTLEMEN: Tell me shop nearest me where I may see a LEMPCO Grinder in operation.
NAME .....
ADDRESS .....
CITY .....STATE .....

FOR EXCELLENCE

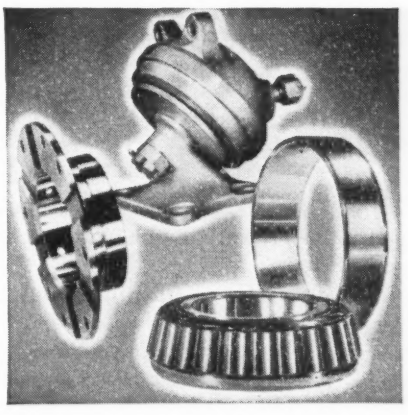
MEN OF TYSON PROUDLY WEAR

The Army-Navy "E"

WE AT TYSON are proud to wear the Army-Navy "E" and fly the burgee—award of excellence in production of war materials.

Long before Pearl Harbor, Tyson was turning out "tools of war." Since then, we've doubled and redoubled plant facilities and production.

In addition to heavy-duty roller bearings for Army and Navy gun mounts and for vital transportation and industrial uses, Tyson craftsmanship produces precision parts for aircraft. Intricate engine suspension units and bearing liners are speeding production of more than half of America's fighting planes.



* * *

To the men in the armed forces, Tyson pledges . . . "enough—and soon enough."

Tyson HEAVY-DUTY BEARINGS and PRECISION AIRCRAFT PARTS

TYSON BEARING CORPORATION ★ MASSILLON, OHIO

DRIVING BAN

(*Continued from Page* 35)

in the drought area not even the OPA could guess, but to judge from the drop in traffic and the deserted parking lots the saving must have been considerable. It was not sufficient, however, to relieve the fuel-oil shortage, for fuel-oil rations for the third period were slashed 10 per cent. Military needs and the increasing difficulty of getting oil to the Eastern seaboard were the reasons given for the new restrictions.

By late January, the fuel-oil situation had become so critical that Ickes banned all shipments of gasoline by railroad tank car to the East so that more fuel oil might be shipped into the area. Prospects were that the prohibition would complicate the Eastern gasoline situation severely.

Following announcement of the ban on pleasure driving, the OPA held out hope that restrictions on gasoline might be raised with the coming of spring. Lighter demand for fuel oil and extension of the 24-in. pipeline to the coast are expected to afford some measure of relief.

Harmful Anti-Freezes Placed Under WPB Ban

BECAUSE of complaints by private car owners, truck operators, and service shops, the WPB has prohibited manufacture of anti-freeze solutions compounded with inorganic salts or petroleum distillates. The solutions prohibited are termed "deleterious anti-freeze solutions" and include solutions compounded with calcium chloride, magnesium chloride, or sodium chloride. Serious damage to the cooling system of cars and trucks has resulted from the use of anti-freeze solutions banned by the order, the WPB reports.

Maximum prices of 75 to 85 cents a gallon have been set for salt-base solutions, while a ceiling of 35 and 43 cents a gallon have been placed on solutions made from naphtha and kerosene. In the case of petroleum distillates sold as anti-freze, the labels must carry, in addition to the identification of the contents, a warning that the solution may cause the motor to overheat and melt rubber connections.

Filling Station Hours Limited to 12 Daily

Hours during which service or filling station may deliver gasoline and other motor fuel to any vehicle except those bearing T stickers and vehicles belonging to certain government agencies were limited on Jan. 25 to not more than 12 in one day or 72 in one week. Deliveries may be made to T ration vehicles and the vehicles of the Army, Navy, Marine Corps, Coast Guard, Maritime Commission, or the War Shipping Administration at any time provided the station operates on a 24-hour basis. The 12 hours during which the station delivers to A, B, and C ration-book holders need not be consecutive, but must not be divided into periods of less than two hours each.

RECENT RULINGS

NEW CARS. Full-time social workers employed by non-profit organizations have been made eligible to buy new passenger cars needed in the performance of certain kinds of work, the OPA has ruled. The purposes for which the purchase of a new car will be approved are: 1, administering relief or investigating the necessity for relief; 2, arranging for placement of minors or aged, handicapped or indigent persons in foster homes or institutions; 3, inspecting foster homes or institutions; 4, investigating reported abuse, neglect, or delinquency of minors; 5, transporting minors or aged, handicapped or indigent persons to foster homes or institutions; 6, transporting persons to hospitals or clinics.

(*Continued on Page* 86)

BLUE STREAK
SERVICE BULLETIN No. 42-43
MATERIAL CONSERVATION TIPS
The Breaker Points
THE DISTRIBUTOR HEAD
Today they carry A VITAL MESSAGE
JUST ONE OF MANY TIPS ON CONSERVATION
Often Breaker Points are replaced when they become pitted in service. This is WASTEFUL AND UNNECESSARY, as a slight dressing of the tungsten surfaces with a fine file or stone will endow them with NEW LIFE.

THOUSANDS of mechanics welcome these monthly bulletins for their valuable information on ignition problems.

Today—geared to wartime America—they carry a vital message. They tell you how to keep vehicles on the road without replacing ignition parts until absolutely necessary.

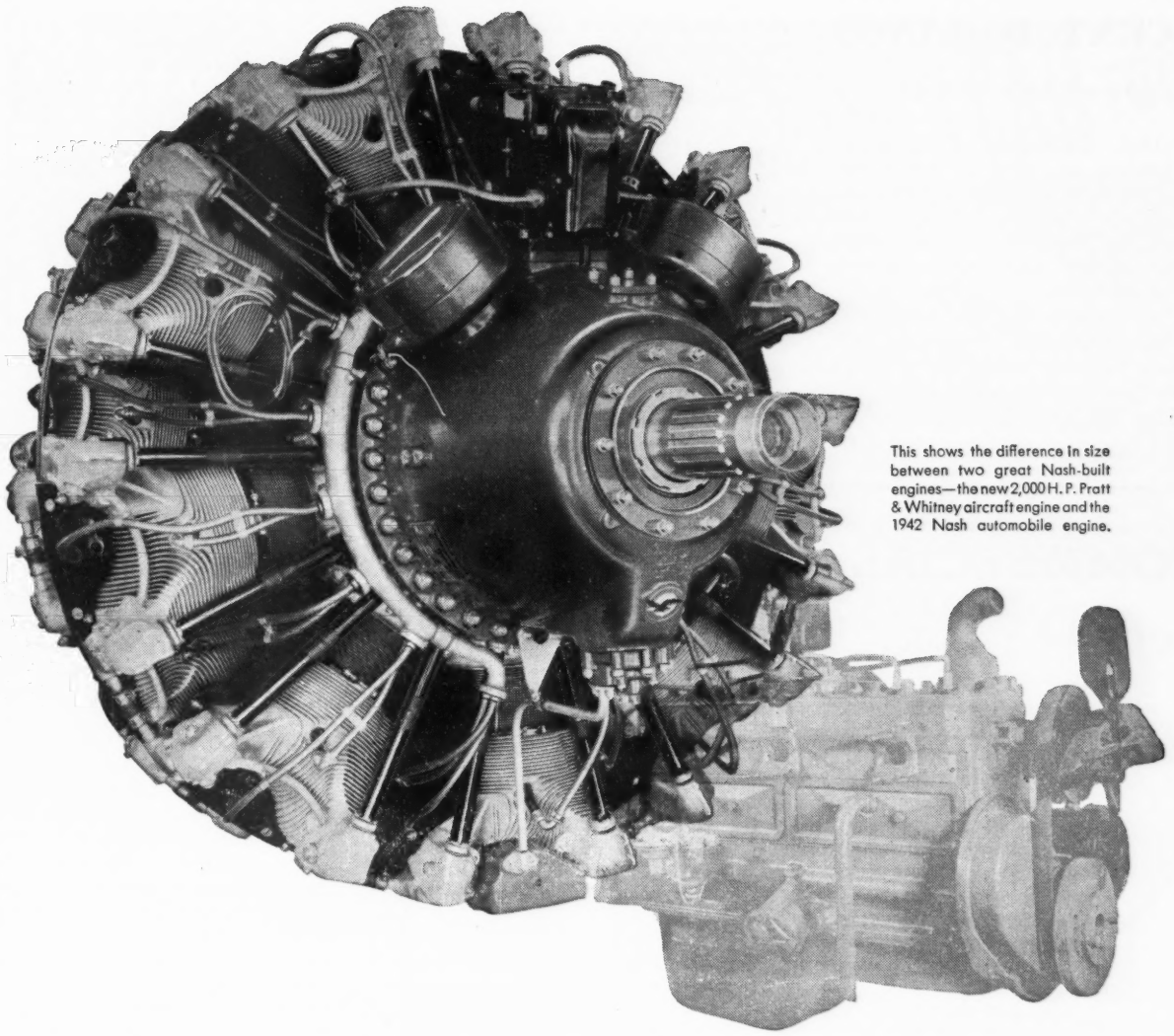
It may be much harder to get ignition parts tomorrow. So don't discard any part until you are *sure* it can't be repaired. In that way you help your customer, yourself and Uncle Sam. When you are sure a part is beyond repair, replace it with "Blue Streak," the line of "Long-life Peak Performance." Conserve "critical" materials!

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

MOTOR STANDARD PRODUCTS BLUE STREAK IGNITION PARTS BATTERY CABLES AUTOMOTIVE WIRE

STANDARD MOTOR PRODUCTS, INC.
37-32 Northern Blvd., Long Island City, N. Y.

"The ABILITY to serve well is as important as the WILL to do so."



This shows the difference in size between two great Nash-built engines—the new 2,000 H. P. Pratt & Whitney aircraft engine and the 1942 Nash automobile engine.

NASH BUILDS GREAT ENGINES!

Take a look at *two thousand horsepower!*

Take a look at the mightiest aircraft engine ever to fly in Axis skies!

Take a good look—for this is the great Pratt & Whitney engine that powers the Navy's *Corsair* fighter . . . now outspeeding, outclimbing, outfighting *any* enemy plane now known!

And then, remember this—*it's built and supercharged by Nash!*

It's a Nash tradition to build *great* engines.

And Nash's skill in building great engines for peace led the Navy to choose Nash to build great engines for war!

That is *our* task . . . *our* duty . . . *our* job.

And it will never be finished until the last Axis plane is shot from the sky, and our boys are free to come home to the jobs they have earned and the place they have won in the hearts of their countrymen!

When Victory does come—it will be our responsibility to turn again to the making of peaceful things. And, out of the new vision, the new skills, the new materials we have developed in building America's *mightiest* engines of war, there will come a great Nash . . . a valuable franchise and a good profit opportunity.

LOOK AHEAD WITH NASH

Division of Nash-Kelvinator Corporation, Detroit, Mich.

RECENT RULINGS

(*Continued from Page* 84)

COUPONS. Holders of A, B, and C book holders in several states are warned by the OPA not to write license numbers of their cars on any more coupons than they can use before the end of the registration period. These seven states—Colorado, Illinois, Mississippi, South Carolina, Virginia, West Virginia, and Wyoming—will issue new registration plates, and any coupons bearing the number of the old plates will become invalidated by issuance of the new plates. The other 41 states and District of Columbia will permit the use of the same plates in 1943 as were issued in 1942.

* * *

SALESMEN. Increased gasoline rations for salesmen outside the 17 Eastern states were issued beginning Jan. 8. Following through an earlier announcement, additional coupons were issued to bring salesmen's rations up to 65 per cent of their 1942 mileage or to 8,600 miles a year, whichever is less. The extra gas was to have been authorized also for Eastern salesmen, but the acute shortage that developed in that area over the year

"See any re-treads coming up soon for me?"

end forced the OPA to cancel the plan for salesmen in the 17 Eastern states. The salesmen eligible to receive the extra rations are those primarily engaged in selling necessary materials or equipment for the operation of naval, military, or hospital establishments or facilities, common carriers, public utilities, industrial, extractive or agricultural establishments essential to the war effort, or any other of the establishments of facilities listed as essential in the gasoline rationing regulations, as well as those principally engaged in selling those foods, building materials, clothing, fuels, and medical supplies which are essential to public health and safety, except those selling direct to consumers for personal family or household use.

* * *

RECAPS. Dealers in retreaded or recapped tires who do not possess their own equipment, may not pass along to the customers the cost of transporting the work to and from other recapping shops, the OPA ruled last month.

* * *

CREDIT. Use of credit cards in the purchase of gasoline was forbidden in Petroleum Directive No. 62, effective Jan. 1. Vehicles displaying T ration stickers, however, were permitted to use credit cards until Feb. 1. Government requisition books are still lawful.

* * *

GAS STOCKS. In an effort to achieve more equitable distribution of gasoline and fuel oil in the Eastern states, Petroleum Administrator for War Ickes on Jan. 13 limited inventories of all gasoline and fuel-oil resellers, as well as industrial and commercial consumers, to a 10 days' supply.

* * *

TIRE EQUIPMENT. An amendment to Order L-61 permits manufacturers of tire retreading, recapping and repair equipment to have on

(*Continued on Page* 92)

COMMERCIAL CAR JOURNAL

Amount of Advertising Space Used Sept.'41 to Nov.'42
COMMERCIAL CAR JOURNAL and COMPETITOR
PAGES
COMMERCIAL CAR JOURNAL
PUBLICATION B
SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV.
'41 '42

Leads in Advertising Volume in the Truck Fleet Field

The chart, of course, tells the story of COMMERCIAL CAR JOURNAL leadership. Any publication, head and shoulders above the others in its field, has the confidence of the manufacturers in its industry —and is getting results for them.

We started making these charts in 1935. They all look about alike — with COMMERCIAL CAR JOURNAL always out in front. It is the No. 1 Truck Fleet publication.

COMMERCIAL CAR JOURNAL

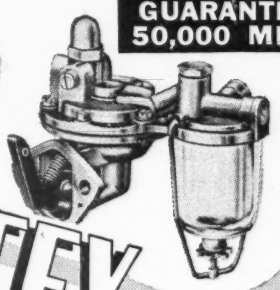
A Chilton Publication

Chestnut & 56th Sts. **Philadelphia, Pa.**

Built for LONG RANGE SERVICE

AIRTEX DIAPHRAGMS GUARANTEED 50,000 MILES

"IT'S A HIT!" Says "AIRY" Tex



AIRTEX Precision Made FUEL PUMPS

3-WAY SERVICE

for prompt, profitable handling of fuel pump business.

1. Diaphragm Kits for minor repairs.
2. Repair Kits for emergency repairs.
3. Complete Exchange Service that gives you factory rebuilt pumps—with the AIRTEX 50,000 Mile Guaranteed Diaphragm—at a low exchange price.

Complete stock of new AIRTEX fuel Pumps still available for all cars and trucks.

The long range service of Uncle Sam's coast defense guns is not the only service that keeps the enemy away from our shores. AIRTEX Fuel Pumps are doing their share by making the limited gasoline supply stretch for untold extra miles of long range service.

Give your customers the many advantages of AIRTEX 3-WAY SERVICE.

Write your Jobber for the profitable AIRTEX dealer deal. Remember . . . Your profits climb with the AIRTEX line.

AIRTEX AUTOMOTIVE CORPORATION FAIRFIELD, ILL.

Where the Work is Tough it's DURO-CHROME TOOLS

Throughout the world all types of fighting and commercial equipment are assembled and maintained with Duro-Chrome Quality Tools. They are modern to the "Nth" degree and as tough as they come. Made in all styles and types. Giant tools of unusual strength to small trim ones for delicate work. Designed for close quarter work where accuracy and speed are necessary. Duro tools can help you too.

Over a billion have been made.

DURO METAL PRODUCTS COMPANY

Dept. MA-1, 2649 N. Kildare

Chicago, Illinois

FOR TOMORROW'S CAR TOO!

ACTUS PRODUCTS

WrapLock Hose Clamps

★ ★ ★ ★

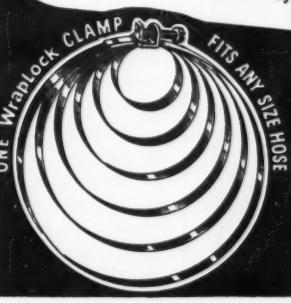
It takes *only one* WrapLock clamp to fit any size hose from ½" to 3". Easy to install before or after assembly. 100% clamping. Millions used by U.S. and foreign governments, engine, plane and auto manufacturers. Lightest, quickest, strongest clamp made. "The Tie That Binds" with *extra-efficiency!*

Actus Piston Ring Compressor

Engineered for better ring installations. Unique method of mechanical contraction. Positively no slippage. Entirely self-contained tool. Adjustable, one size for all pistons 2.6" to 4.25". Takes 4 rings. Off-center pull closes gap correctly. Cadmium plated, *it's rustproof!*

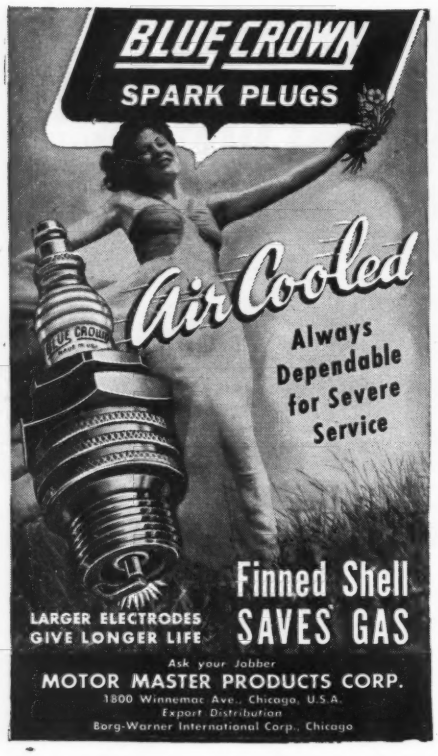
Actus Valve Guide Cleaner

Automatically adjusts to any Guide size. Cuts carbon clean, polishes without abrasion. Cleaner is "self-cleaning." *A better job in half the time.* Just insert in any hand or electric drill chuck.



ACTUS PRODUCTS COMPANY

Mount Vernon, N. Y.



FITZGERALD
GASKET CRAFTSMEN SINCE 1906
GASKETS

The complete line that completely satisfies

The Fitzgerald Manufacturing Company
Torrington, Conn.

Make Big Profits on Small Investment in
SHURHIT IGNITION PARTS

Ask your Shurhit jobber or write us for details on General Ignition Assortments of fast-moving parts . . . Contact Points . . . Condensers . . . Rotors . . . Caps . . . Coils . . . Switches, etc.

SHURHIT PRODUCTS, INC.
Waukegan, Ill.

THERE IS A GUARANTEED
Pedrick
ENGINEERED SET
of PISTON RINGS
FOR EVERY CAR, TRUCK, BUS, AND TRACTOR

RECENT RULINGS

(*Continued from Page* 86)

hand one sixth as many component parts they manufactured in 1941. This inventory may be built up without having purchase orders on hand, but they may not be assembled until such orders have been received. Tire equipment of this kind may be sold only on priorities of A-9 or higher.

* * *

CREDIT. Trucks displaying T ration stickers have been excepted from the order of the Petroleum Administrator for War forbidding the use of gasoline credit cards after Feb. 1. Federal, state, and local vehicles and commercial motor boats also are excepted.

* * *

TIRE QUOTA. Considering the shortness of the month as compared with January, tire and recapping quotas for February are higher than for the previous month. The quota for passenger-car recapping services is 851,125, compared with 800,000 for January. The Grade I tire quota is 161,000, unchanged from January, and the Grade II quota is 225,500, compared with the January quota of 230,000. The allotment of Grade III tires is 690,475, compared with 690,000. Passenger-car inner-tube allotments total 759,000 as against 709,336 for January.

* * *

CAR QUOTA. The February quota of new passenger cars has been set at 29,650. The January quota was 32,000 cars. Figures for February do not include state reserves of 4866 cars, regional reserves of 1995, and national reserves of 2000.

* * *

BULK COUPONS. Old-type coupons good for 100 gal. of gasoline issued to users of big quantities of gasoline, were voided Jan. 22. New coupons, bearing the word "gasoline" are being issued by local War Price and Rationing Boards on restatement of minimum requirements.

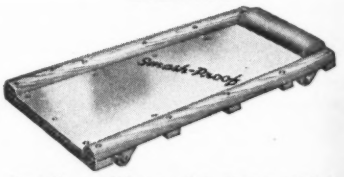
* * *

CAR SALES. An amendment to Ration Order No. 2A permits civilians to purchase new passenger cars, provided they have signed a contract with the Army to provide transportation for civilian airplane spotters to and from their observation posts. The applicant for registration of an unregistered car must submit a contract showing he has agreed to furnish a car to the airplane-warning service for a period of at least three months. During the three months, he agrees not to use the car for any other purpose. It is estimated that the Army needs about 1000 loan cars in various sections of the country.

BUELL
AIR HORNS
AVAILABLE ON PRIORITY

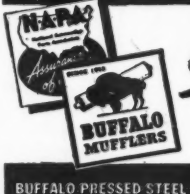
BUELL AIR COMPRESSORS are used on bomber planes to operate essential equipment.
BUELL MANUFACTURING CO.
2991 Cottage Grove Ave., Chicago, Illinois

Smash-Proof
CREEPERS



Contain a minimum of scarce materials needed in the war effort.
HULBERT CREEPER CO.
ASHTABULA, OHIO

Buffalo MUFFLERS



Stop that Noise!
BUFFALO PRESSED STEEL CO., INC., YOUNGSTOWN, OHIO

RBC ROLLER BEARINGS

Increase Efficiency of our War Industry's Machine Tools

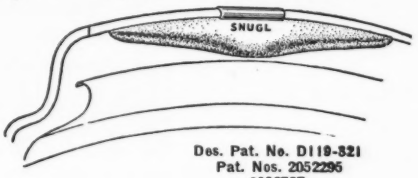
ROLLER BEARING COMPANY of AMERICA

26 Whitehead Road TRENTON, N. J.

NOW that WHEEL BALANCING is virtually COMPULSORY

use the weights the U. S. Government uses

Snugl



Des. Pat. No. D119-821
Pat. Nos. 2052295
2036757

Fade-away BALANCE WEIGHTS

to keep your customers' cars rolling. Get more miles from their tires—Use SNUGLS—the weights with the dove tail clip that cannot rattle or work loose. Easy to install. Sizes ½ oz. to 1½ lbs.

Ask your Jobber or write us direct for full details.

Manufactured by

MID-WESTERN AUTO PARTS, 824 E. Elm St., Kokomo, Ind.

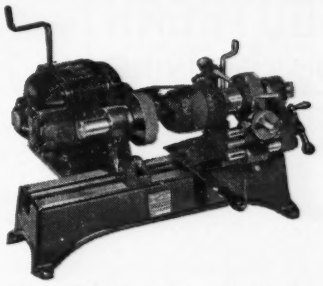
Western Distributor: Kenneth V. Mills, 910 W. Pico Blvd., Los Angeles, Cal.

Increase Your Shop Profits!

SHOPS generally throughout the country are installing the TRUCUT Armature Lathe & Undercutter, because of the extra profits it brings them. Instead of sending out their starter and generator work, they find it extremely profitable to do this work themselves.

With TRUCUT equipment in your shop, you can machine and undercut burned or out-of-round commutators, make them like new, in 5 minutes.

The TRUCUT is now in use in thousands of shops, giving positive satisfaction and making money for its owners.



TRUCUT Armature Lathe & Undercutter

Recognized the country over for its Speed, Accuracy and Time Saving features. Comes to you complete with Mica Undercutter, Centering Chucks — no extras to buy. The TRUCUT will perform at a profit in any shop.

See your jobber—or send the coupon—today.

FRANK N. WOOD CO., Dept. 2-17, Wauwatosa, Wis.

Pacific Coast Address: 1340 South Flower Street, Los Angeles, California

FRANK N. WOOD CO., Dept. 2-17, Wauwatosa, Wis.
(Suburb of Milwaukee)

Send complete information on ☐ TRUCUT Armature Lathe & Undercutter ☐ TRUCUT Mica Undercutter; ☐ TRUCUT Tailstock Rest; ☐ TRUCUT General Purpose Press. Give name of jobber in our locality.

Name .....

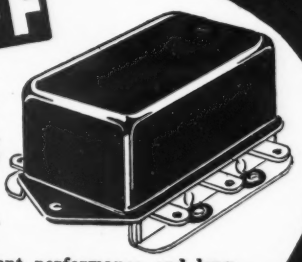
Street Address .....

City ..... State .....

Nature of Business .....

NIEHOFF

VOLTAGE REGULATORS



A Complete and Up-to-Date Line for All Cars. 3 Unit, Vibrating type. They embody the finest workmanship and highest quality materials to insure efficient performance and long service. They automatically control generator output and adjust charging rate with current load requirements. Also prevent battery overcharging and high voltage troubles. Ask your Jobber.

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VELLUMOID

With VELLUMOID Sheet

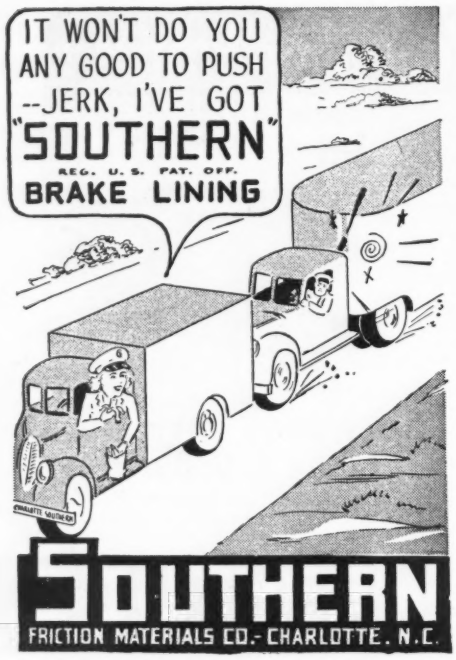
You can always cut or tap out a dependable gasket that will insure your work and prolong the life of the cars you service. Sold through jobbers.

The Vellumoid Co., Worcester, Mass.

E. C. Fink

E. C. Fink, president and chairman of the board of Mack Trucks, Inc., died in New York City on Jan. 1 following a heart attack. He was 62 years old.

A pioneer in the truck industry, Fink had been an officer of the company since its organization in 1911 following a consolidation of the Mack Bros. Motor Car Co., the Hewitt Motor Co. and the Sauer Motor Truck Co. He was for many years vice president in charge of production at at the company's plants in Allentown, Pa., Plainfield, N. J. and New Brunswick, N. J. In this capacity he supervised the development of Mack truck, bus and fire apparatus models over a period of years that saw far-reaching changes in the design and construction of motor vehicles and in the extension of their use.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WHAT MAGAZINE HAS TOP CIRCULATION IN THE FARM AND RURAL FIELD?
FARM JOURNAL
OVERWHELMINGLY AMERICA'S LARGEST RURAL MAGAZINE.... 2,650,000

Paterson Is Named Plymouth Vice President

Promotion of A. H. Paterson, general works manager of Plymouth to the title of vice-president, is announced by D. S. Eddins, president of the Plymouth Division of Chrysler Corp.

Paterson has been a part of the Plymouth organization since it was established as a manufacturing unit in 1928, starting as superintendent of planning then as factory manager and since 1940, general works manager.

Paterson entered the automobile industry with Dodge Brothers 29 years ago, shortly after he had come to this country an immigrant youth from Scotland. In Scotland he had served his machinist apprenticeship working in the famous Clyde shipyards.

NSPA Adds 125 Members

Ending a year which witnessed the most substantial membership gain in its history, the National Standard Parts Association in December approved 50 new applications to establish a new high record for total membership. The wholesaler-manufacturer organization, during 12 months of war-time operation, added 125 new firms to its roster.

Heading the NSPA membership committee last year was Franklin C. Bradley, Connecticut Bearings Co., Inc., New Haven, Conn.

Wholesalers on the latest list of new members represent automotive distribution in 25 states. One of the firms listed is a manufacturer. The complete membership of NSPA will be shown in a new 1943 roster to be issued soon.

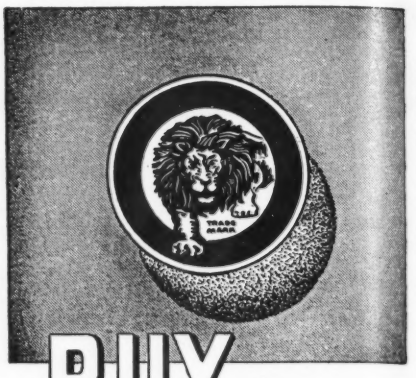
Willys-Overland Net Up

The first automobile company to convert 100 per cent to war production, Willys-Overland Motors, Inc., reports net profit, after all charges, including taxes and contingency reserves, of $1,265,399, which was equal to approximately 1.2 per cent of sales, according to the statement to stockholders for the fiscal year ended Sept. 30, 1942, signed by Ward M. Canaday, chairman, and Joseph W. Frazer, president.

Sales totaled $109,273,626, of which 96 per cent represented the complete manufacture of a broad diversity of armaments, including Jeeps, powder and ammunition hoists, gun parts, shells, bullet cores, tank parts, aircraft forgings and sub-assemblies.

Classified Advertisement

FOR SALE: Bendix Brake machine and Turco Radiator flusher; practically new. V. A. Samuelson & Co., Port Angeles, Wash.



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TONS OF TIRES *Saved*
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At least 108,000 tons a year! Help to keep 'em rolling by balancing your customers' wheels with L & H Balancing weights. They reduce tire wear 20% to 25%.
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Truck Lines Merge

The consolidation of seven large Eastern motor carriers into Associated Transport, Inc., will be completed Jan. 1 when Consolidated Motor Lines, Inc., of Hartford, Conn.; McCarthy Freight System, Inc., of Trenton, Mass.; and M. Moran Transportation Lines, Inc., of Buffalo, N. Y., cease operating under these names and become an integral part of Associated Transport, Inc. The Southern carriers whose operations have already been consolidated are Barnwell Brothers, Inc., of Burlington, N. C.; Horton Motor Lines, Inc., of Charlotte, N. C.; Southeastern Motor Lines, Inc., of Bristol, Va.; and Transportation, Inc., of Atlanta, Ga.

Associated Transport, Inc., will operate 3,500 vehicles over 24,000 miles of unduplicated route extending from the Canadian border to the Gulf of Mexico, and west to Cleveland, Pittsburgh, Nashville and New Orleans. Connecting carriers serve points as far west as Chicago and St. Louis.

The formation of Associated Transport is expected to speed shipments by obviating the need for frequent transfer of freight.

Kay Chosen President by Detroit Dealers

Webb Kay, of the Dahlinger-Kay Co., Ford dealers, has been elected president of the Detroit Auto Dealers Association for 1943. Other officers of the association are Jack Rose, of Louis Rose Co., DeSoto dealers, vice president; David Barnett, of Barnett Motor Sales, Chrysler-Plymouth dealers, secretary, and Clarence Hacquoil, of Hacquoil Buick Co., treasurer.

Scrap Pile Grows

General Motors reported Jan. 12 4,000,000-lb. increase in its November scrap collections compared with those in October.

During the first 11 months of 1942 more than 1,000,000,000 lb. of salvage were turned over to material processors by G.M. plants and dealers, according to B. D. Kunkle, vice-president in charge of manufacturing. Metal collections fed into the mills and smelters enough scrap to put 33,000 tanks in the field or to make 28,000,000 .50-caliber machine guns. In addition, tons of rubber, rope, rags, paper, burlap bags and other scarce materials have been salvaged.

Aid Scrap Drive

Oldsmobile's contribution during December to the scrap with which to stock the nation's blast furnaces totaled more than 8,000,000 lb. of metal of all kinds, according to a report issued by this division of General Motors Corp. During the past 12 months, the total of metals shipped by Oldsmobile to government receiving stations has reached 85,000,000 lb. This volume is in addition to more than 7,750,000 lb. of scrap metal contributed in the past 3 months by a group of Oldsmobile dealers throughout the nation.

William O. Banta

William Orwin Banta, 58, sales manager of the replacement service division of the Sealed Power Corp., died suddenly on Dec. 31, at his home in Muskegon Heights, Mich. He was born near Rensselaer, Ind., and attended school in Chicago, later being graduated from Valparaiso University.

Banta joined the staff of the Sealed Power Corp. in July, 1935, as district manager in California, becoming sales manager of the service division in 1937.

Sales Up, Net Down

Black and Decker Mfg. Co., Towson, Md., reports that for the year ending Sept. 30, 1942, its consolidated sales were $16,184,833.13 with profits before taxes of $3,825,578.33. This compares with consolidated sales of $11,972,530.25 with profits before taxes of $2,867,642.19 for the previous fiscal year.

Taxes for the 1942 fiscal year, estimated on the revenue acts of the United States, Great Britain and Canada, were $2,534,784.37, compared with $1,936,907.89 actually paid the year before. Net profits before setting up reserves was equal to $3 a share for the 1942 fiscal year, compared with $3.78 for the previous year.

LEONARD PATENTED Air Cooled SPARK PLUGS

Save Man-hours and Critical Materials

Flat electrodes, side-spaced, eliminate frequent regapping.

Frequent regapping is unnecessary with Leonard Spark Plugs. Valuable time saved! Even when the intense heat of today's high speed motor causes ground wire to move in an upward direction the gap remains the same. This "gap control" also prevents power loss.

Leonard's AIR-COOLED center electrode carries off excess heat, greatly prolonging plug life. "Critical" materials conserved.

LEONARD SPARK PLUG CO., INC., NEWARK, N. J.

Keep 'em Rolling

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The standard of the industry. Quick-tightening, perfect leak-proof hose connections, for original equipment and replacement. For Radiator, Heater, Booster Brakes and High Pressure hose connections. Wittek Manufacturing Co., 4305-15 W. 24th Place, Chicago, Ill.

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